



## PRELIMS MISSION TEST-16 (30-03-2024)

### EXPLANATION

1. Consider the following statements about Temperature Inversion

1. It is the increase in temperature with increasing height temporarily or locally.
2. Short winter nights, cloudy sky, cold air and the presence of winds lead to temperature inversion.
3. During a temperature inversion, the temperature may fall below freezing point in the valleys leading even to the occurrence of frost.
4. Over polar region, temperature inversion is normal throughout the year

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** Long winter nights, clear skies, dry air, and the absence of winds are ideal for temperature inversion. These situations leads to rapid radiation of heat from the surface and lower layers of the atmosphere resulting into cooling of the air near the earth surface. The upper layers which loose their heat not so rapidly, are comparatively warm. Hence the normal condition in which temperature decreases with increasing height is reversed. The cooler air is nearer the earth, and the warmer air is aloft. In other words, temperature increases with increasing height temporarily or locally. This phenomenon is termed inversion of temperature.

**Statement 2 is incorrect:** The presence of cloudy sky traps the terrestrial radiation near the earth surface because of which it prevents the earth surface from getting cooled. Thus short winter nights and cloudy sky does not lead to Temperature Inversion.

**Statement 3 is correct:** During winters, the mountain slopes cool very rapidly due to the quick heat radiation. The air resting above them also becomes cold, and its density increases. Hence, it moves down the slopes and settles down in the valleys. This air pushes the comparatively warmer air of valleys upwards and leads to the phenomenon of inversion of temperature. Sometimes the temperature falls below

freezing point in the valleys leading even to the occurrence of frost.

**Statement 4 is correct:** The day's heat radiates off during the night, and by early morning hours, the earth is cooler than the air above. Over polar areas, a temperature inversion is normal throughout the year.

2. Consider the following statements about Coriolis force

1. It is responsible for the formation of meandering in the river.
2. It helps sustain the cyclonic circulation in the Doldrum region
3. It is maximum at the pole as compared to the equator and inversely proportional to the velocity of the wind.
4. It effects the rotation of celestial bodies such as planets and stars

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is correct:** The Coriolis effect makes planes and air currents that travel long distances around the earth appear to move at a curve instead of a straight line. The Baer Babinet law, sometimes called Baer's law, identifies a way in which the process of formation of rivers is influenced by the rotation of the Earth and because of the rotation of the Earth, erosion occurs mostly on the right banks of rivers in the Northern Hemisphere, and in the Southern Hemisphere on the left banks. Hence in the course of the erosion, an advance of the wave-line of the meander formation is bound to take place in the direction of the current.

**Statement 2 is incorrect:** Doldrums is a region of low atmospheric pressure between five degrees north and south of the equator. The Coriolis force of this region is zero and increases with latitude. Coriolis force at 5° latitude is significant enough to create a storm [cyclonic vortex]. About 65 percent of cyclonic activity occurs between 10° and 20° latitude. The cyclonic wind movements are anti-clockwise in the northern hemisphere and clockwise in the southern



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hemisphere, and it is due to the Coriolis force. Because of zero Coriolis force, the Doldrums region lacks cyclone formation.

**Statement 3 is incorrect:** The magnitude of Coriolis force is directly proportional to wind speed (velocity). The higher the wind speed, the greater the deflection. The Coriolis effect is maximum at the poles and zero at the equator. Coriolis force always acts in a direction that is perpendicular to the moving object's axis. Thus, the Coriolis force is not inversely but directly proportional to the velocity of the wind.

**Statement 4 is correct:** The Coriolis Effect also impacts the rotation of celestial bodies such as planets and stars. It affects the motion of gases and liquids within these bodies, contributing to their rotation and the formation of planetary systems.

3. Consider the following statements about Volcanoes

1. Volcanoes are responsible for creating more than 80 percent of the Earth's surface.
2. A volcano that has remained dormant for decades cannot become active again.
3. Over the years, volcanic materials have formed the most fertile Earth soil.
4. Fissure type volcanoes are resulted in the formation of plateaus

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** Volcanoes have played a key role in forming and modifying the surface of the planet Earth. More than eighty percent of the Earth's surface, above and below sea level, is of volcanic origin. Numerous volcanic eruptions have produced majestic landscapes like mountains, plateaus, and plains.

**Statement 2 is incorrect:** A volcano that has remained dormant even for a century can become active again. It was witnessed in the United States on March 27, 1980. Mount St. Helens Volcano in the Cascade Range, Washington, reawakened after more than a century of dormancy and provided a dramatic and tragic reminder that there are active volcanoes in

the "lower 48" States as well as in Hawaii and Alaska. Mount St. Helens is expected to remain intermittently active for months or years, possibly even decades.

**Statement 3 is correct:** Over the years, volcanic eruptions have caused subsequent erosion and weathering of landmasses, leading to the break-down of even the volcanic materials to form some of the most fertile soils on Earth, cultivation of which fostered and sustained civilizations.

**Statement 4 is correct:** Major types of volcanoes erupt from a vent or hole and form a conical hill. Fissure types of volcanoes erupt through a crack or fissure and cause the formation of plateaus and shields.

4. Consider the following statements about Ocean Waters

1. The continuous flow of large volumes of water in a definite direction is referred to as Waves.
2. Ocean water level is higher near the equator than at the middle latitudes.
3. Cold currents are found on the west coast of the continents, both in low and higher latitudes
4. Fishing is an important economic activity in regions where warm and cold currents meet.

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is incorrect:** Waves are the energy, not the water as such, which moves across the ocean surface. Water particles only travel in a small circle as a wave passes. The horizontal and vertical motions are common in ocean water bodies. Horizontal motion refers to ocean currents and waves. Vertical motion refers to tides. Ocean currents are the continuous flow of a huge amount of water in a definite direction from one place to another.

**Statement 2 is correct:** Heating by solar energy causes the water to expand (thermal expansion of water). That is why the ocean water is about 8 cm higher near the equator than in the middle latitudes.



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This causes a slight gradient, and water flows down the slope.

**Statement 3 is incorrect:** In tropical and sub-tropical latitudes of both hemispheres, these cold currents are found on the western side of the continents. But in the middle and higher latitudes of the northern hemisphere, the cold currents are found on the eastern sides of the continents. Warm currents flow parallel to the east coasts of the continents in tropical and subtropical latitudes.

**Statement 4 is correct:** When the warm and cold ocean currents meet, upwelling and downwelling occur. Due to this, the nutrients in the sub-surface are brought to the surface. These nutrients encourage the growth of algae and phytoplankton, which act as food for the fish. Hence, fishes come to these regions more and breed here. So, fishing became an important economic activity in regions where warm and cold currents meet.

5. Consider the following statements

1. The climate is characterized by warm, moist summer and cool, dry winter.
2. Well-distributed rainfall throughout the year but maximum in June, July and August
3. Wet paddy or swamp rice is cultivated majorly in this type of climate

The above features are distinct characteristics of which among the following climate?

- (a) The tropical Monsoon climate
- (b) The warm temperate eastern margin
- (c) The cool temperate western margin
- (d) The temperate continental climate

Ans: b (The warm temperate eastern margin)

**Explanation:** The warm temperate eastern margin climate is characterized by a warm, moist summer & a cool, dry winter strongly modified by maritime influences. Occasionally, the penetration of cold air from the continental interiors may bring down the temperature to the freezing point, but most of the time, it is pleasantly warm.

The key differences between the temperate monsoon climate type and the warm temperate eastern margin climate lie in their distinct rainfall patterns, temperature ranges, and geographical distributions. The monsoon climate exhibits pronounced **seasonal**

**variations in rainfall** and temperature, influenced by the monsoonal circulation, while the warm temperate eastern margin climate features more consistent rainfall and milder, less variable temperatures influenced by maritime air masses.

6. Consider the following statements about Ocean gyres

1. They are large circulations in the ocean caused due to planetary winds and the Coriolis effect
2. The Sargasso Sea is associated with the north Atlantic gyre and is known for its biodiversity.
3. The Great Pacific garbage patch is the largest collection of marine pollutant materials associated with North Pacific gyre circulation

Which of the statements given above are correct?

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

Ans: d (1, 2 and 3)

**Statement 1 is correct:** An ocean gyre is a large system of circular ocean currents formed by global wind patterns and forces created by earth rotation (Coriolis force). The movement of the world's major ocean gyres helps drive ocean conveyor belt. The ocean conveyor belt circulates ocean water around the entire planet. The ocean conveyor belt is essential for regulating temperature, salinity, and nutrient flow throughout the ocean.

**Statement 2 is correct:** The Sargasso Sea is a fundamentally important part of the world ocean, located within the North Atlantic sub-tropical gyre with its boundaries defined by the surrounding currents. Its importance derives from a combination of physical and oceanographic structure, complex pelagic ecosystems, and its role in global ocean and earth system processes. It is home to an iconic pelagic ecosystem with the floating Sargassum seaweeds. It hosts a diverse community of associated organisms that includes ten endemic species and provides essential habitat for key life stages of a wide diversity of species, many of which are endangered or threatened. A variety of oceanographic processes

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impact productivity and species diversity, and the area plays a disproportionately large role in global ocean processes of oxygen production and carbon sequestration.



**Statement 3 is correct:** The Great Pacific Garbage Patch is a collection of marine debris in the North Pacific Ocean. Also known as the Pacific trash vortex, the garbage patch is two distinct collections of debris bounded by the massive North Pacific Subtropical Gyre.

7. Consider the following

Lake	Associated Physical Feature
Kettle lake	Karst region
Oxbow lake	River meanders
Lagoon Lake	Coastal region
Playa Lake	Wind erosion

How many pairs are correctly matched?

- Only one
- Only two
- Only three
- All four

Ans: c (Only three)

**Pair 1 is incorrectly matched:** A kettle (also known as a kettle lake, kettle hole, or pothole) is a depression/hole in an outwash plain formed by retreating glaciers or draining floodwaters. The kettles are formed as a result of blocks of dead ice left behind by retreating glaciers, which become surrounded by sediment deposited by melt water streams as there is increased friction. In contrast, the Karst region is related to the Underground topography.

**Pair 2 is correctly matched:** An oxbow lake starts as a curve, or meander, in a river. A lake forms as the river finds a different, shorter course. The meander becomes an oxbow lake along the side of the river.

**Pair 3 is correctly matched:** A lagoon is a shallow body of water protected from a larger body of water (usually the ocean) by sandbars, barrier islands, or coral reefs around the Coastal region. They are often called estuaries, sounds, bays, or even lakes.

**Pair 4 is correctly matched:** The playa, also called pan, flat, or dry lake, is a flat-bottom depression that is caused by Wind erosion and is found in interior desert basins and adjacent to coasts within arid and semi-arid regions, periodically covered by water that slowly filtrates into the groundwater system or evaporates into the atmosphere, causing the deposition of salt, sand, and mud along the bottom and around the edges of the depression.

8. Consider the following statements about Jet Streams

- They are high-velocity stratospheric winds present in both hemispheres
- They shift Southwards during summer and blow in Southern Asia
- The westerly Jet streams are more extensive and stronger during the summer season
- Tropical Easterly Jet Stream are established during the summer season and plays an important role in the onset of the Indian monsoon

How many statements given above are correct?

- Only one
- Only two
- Only three
- All four

Ans: a (Only one)

**Statement 1 is incorrect:** Jet streams are the strongest high-velocity winds that blow in the atmospheric layer of the Troposphere, exactly in Tropopause and not in the Stratosphere. They occur in both the hemispheres of the Earth.

**Statement 2 is incorrect:** The jet streams are a narrow belt of fast-blowing winds located generally at 12,000-meter height above sea level. They bring western cyclonic disturbances along with them. These



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cyclonic winds originate near the Mediterranean Sea and move eastwards. On their way, they collect moisture from the Persian Gulf and shed it in the North western part of India during the winter seasons. These Jet streams shift northwards during the summer season and blow in Central Asia, which helps in the onset of monsoons.

**Statement 3 is incorrect:** Jet streams are stronger in winter in the northern and southern hemispheres because air temperature differences that drive them tend to be most pronounced due to the expansion of polar cells towards the south. For example, in India, subtropical westerly jet streams, which are more extensive and stronger, blow south of the Himalayas all through the year except in summer. The western cyclonic disturbances experienced in the north and north-western parts of the country are brought in by this westerly flow. In summer, the subtropical westerly jet stream moves north of the Himalayas with the sun's apparent movement.

**Statement 4 is correct:** An easterly jet stream, called the sub-tropical easterly jet stream, blows over peninsular India, approximately over  $14^{\circ}\text{N}$  during the summer months, only after the western jet stream has withdrawn itself from the region. This easterly jet stream is held responsible for the burst of the monsoon in India.

9. Among the following climatic conditions, identify the one which is not related to El-Nino circulation in the Pacific Ocean.

- (a) More frequent hurricanes in the North Atlantic Ocean
- (b) Higher sea surface temperature in the tropical eastern Pacific Ocean
- (c) Dry conditions in Southeast Asian countries
- (d) Floods in Peru and Ecuador

Ans: a (More frequent hurricanes in the North Atlantic Ocean)

**Explanation:** The change in winds with height is referred to as vertical wind shear. Hurricane formation requires that winds be fairly uniform throughout the atmosphere. In other words, hurricanes cannot form if the vertical wind shear is too high. El Nino produces stronger westerly wind at upper levels of the atmosphere across the tropical

Atlantic than in normal non-El Nino seasons. El Nino increases the total vertical wind shear, shearing the tops from developing storms before a healthy circulation can form. El Nino events generally suppress Atlantic hurricane activity, so fewer hurricanes than normal form in the Atlantic from August to October, the peak of Atlantic hurricane season.

During La Nina, westerly winds high in the atmosphere weaken. La Nina results in an expanded area of low vertical wind shear, allowing more Atlantic hurricanes to develop during the La Nina events. La Nina increases the number of developing hurricanes and allows stronger hurricanes to form. The chances for the continental U.S. and the Caribbean Islands (North Atlantic Ocean) to experience a hurricane increase substantially during La Nina and decrease during El Nino.

10. Consider the following statements about Soils

- 1. Generally, plants grow well in mild alkaline soil
- 2. Adding sulphur to the soil reduces the alkalinity of the soil.
- 3. Black soils are well aerated but poor in the water holding capacity.
- 4. Maximum humus content is found in the subsoil region due to dead and decaying organisms.

How many statements given above are correct?

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

Ans: a (Only one)

**Statement 1 is incorrect:** Generally, plants grow well in Loamy soil with a pH of 4 to 6 (acidic). It has a mixture of sand, clay, and soil particle known as silt and humus. It has a good water-holding capacity for the growth of plants, whereas, for alkaline soil, the pH has to be more than 7.

**Statement 2 is correct:** The cheapest way to lower the soil pH (alkalinity) is to add elemental sulphur to the soil. Soil bacteria change the sulphur to sulphuric acid, lowering the soil pH. If the soil pH exceeds 5.5,

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apply elemental sulphur (S) to decrease the soil pH to 4.5

**Statement 3 is incorrect:** Black soils (also called as Regur soil) are clayey soil in which water can be held in the tiny gaps between the clay particles. So they have less air but are heavy as they hold more water than the sandy soils. At the same time, the Sandy soil is well aerated but poor in water holding capacity due to large sand particles.

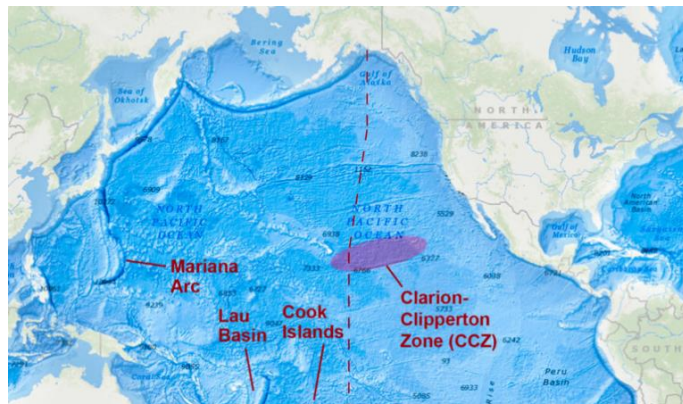
**Statement 4 is incorrect:** The uppermost horizon is generally dark in color and rich in humus and minerals. The humus makes the soil fertile and provides nutrients to growing plants. This layer is generally soft and porous and can retain more water. It is called the topsoil or the A-horizon. This provides shelter for many living organisms, such as worms, rodents, moles, and beetles. The roots of small plants are embedded entirely in the topsoil. The next layer has a lesser amount of humus but more minerals. This layer is generally harder and more compact and is called the B-horizon, the middle layer, or the subsoil.

11. Which of the following statement best explains the significance of the Clarion-Clipperton Zone?

- (a) A submarine region in the Pacific Ocean is estimated to contain abundant metallic nodules
- (b) A convergent plate boundary near Tonga island in the Pacific Ocean
- (c) A dead zone resulted from oxygen depletion in oceanic water in the Gulf of Mexico
- (d) A disputed exclusive economic zone between Brazil and Argentina.

Ans: a (A submarine region in the Pacific Ocean is estimated to contain abundant metallic nodules)

**Explanation:** Polymetallic nodule resources contain nickel, cobalt, manganese and copper. In the Pacific Islands region, the manganese nodule deposits with the greatest abundance and concentration of metals are found. While they occur in all oceans, the Clarion-Clipperton Fracture Zone<sup>2</sup> CCZ (a submarine region in the Pacific Ocean) deposits are among the richest, containing high grade and high abundance nodules.



12. Consider the following mechanisms responsible for climate change

1. Sunspots causing the difference in solar radiation
2. Variations in distance and tilt of Earth with respect to the Sun
3. Major volcanic eruption
4. Changes in magnetic field strength of Earth

How many statements given above are correct?

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

Ans: d (All four)

**Statement 1 is correct:** Sunspots are dark, planet-size regions of strong magnetic fields on the sun's surface. They can spawn eruptive disturbances such as solar flares and coronal mass ejections (CMEs). When sunspots interact with each other, they cause explosions of energy. Solar flares are large eruptions of energy coming off the Sun containing several different forms of energy: heat, magnetic energy, and ionizing radiation. The ionizing radiation released during solar flares includes x-rays and gamma rays. Thus Sunspots cause a difference in sun radiation and play a role in climate change.

**Statement 2 is correct:** According to Milankovitch's theory, there are three changes in earth's orbit around the sun. They are eccentricity, axial tilt and precession.

When the earth is closer to the sun, our climate is warmer, and this cycle also affects the length of the season. The measure of a shape's deviation from being circle, in this case, the earth's orbit is called

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eccentricity. The amount of sun heat that reaches the earth's surface subsequently influences climate patterns, including period of glaciations. Small change in the angle of earth tilt and shape of its orbit around sun can change the climate over a span of 10,000 to 100,000 years.

**Statement 3 is correct:** The movement of the plates also causes volcanoes and mountains to form, which can also contribute to a change in the climate. Volcanoes affect the climate through the gases and particles (ash) thrown into the atmosphere during eruptions. During major explosive volcanic eruptions, large amounts of volcanic gas, aerosol droplets, and ash are released.

**Statement 4 is correct:** Earth's magnetic field contribute to global warming and can cause catastrophic climate change. The magnetic field protects our planet from cosmic radiation and the charged particles emitted by our Sun. It also provides the basis for navigation with a compass.

13. Consider the following statements about South Atlantic Anomaly (SAA)

1. It is the behaviour of Earth's Geo-Magnetic field in an area between Africa and South America.
2. The area where the Earth's inner Van Allen radiation belt comes closest to the Earth's surface
3. The SAA is the near-Earth region where the Earth's magnetic field is strongest
4. This leads to an increased flux of energetic particles in this region

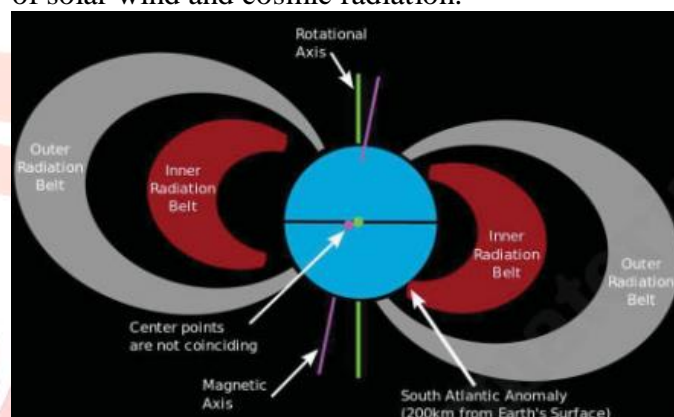
How many statements given above are correct?

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

Ans: c (Only three)

**Explanation:** The behaviour of earth's geomagnetic field in an area between Africa and South America is being termed the South Atlantic Anomaly and it is the area where inner Van Allen radiation belt comes closest to Earth's surface, dipping down to an altitude of 200 kilometres. This leads to an increased flux of energetic particles in this region and exposes orbiting

satellites to higher-than-usual radiation levels. The effect is caused by the non-concentricity of Earth and its magnetic dipole. Earth has two such belts, and sometimes others may be temporarily created. The belts are named after James Van Allen, credited with their discovery. Van Allen radiation belt is a zone of energetic charged particles, most of which originate from the solar wind, that are captured by and held around a planet by that planet's magnetosphere. The SAA is the near-Earth region where Earth's magnetic field is weakest, protecting the planet from high doses of solar wind and cosmic radiation.



14. Which of the following is not primarily the result of gravitation force of Earth?

- (a) River flow
- (b) Land Slides
- (c) Tides
- (d) Lahar flow

Ans: c (Tides)

**Explanation:** Tides are caused due to the pulling effect of the Sun and Moon, where the role of Earth's gravitational pull could be ruled out. River Water flows downwards from the mountains (most of the time, unless otherwise) because of the Gravitational Pull of the Earth.

Tides are defined as the periodic rise and fall of the sea level once or twice a day, mainly due to the attraction of the sun and the moon. The gravitation pull to a great extent and a lesser extent, the sun's gravitation pull are the major causes of tide's occurrences.

Another factor is centrifugal force, which is the force that acts to counterbalance gravity. Together, the gravitational pull (Moon and Sun) and the centrifugal



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force are responsible for creating the two major tidal bulges on the earth. The Earth's gravity only keeps the water on the planet's surface. However the moon is large enough and close enough that its gravitational force has a noticeable effect on large bodies of water on Earth.

Lahar is an Indonesian term that describes a hot or cold mixture of water and rock fragments flowing down the slopes of a volcano and (or) river valleys. These lahars always flow downstream because of the Gravitational Pull of the Earth.

15. Consider the following statements about Hotspot Volcanoes

1. It refers to the active volcanoes found along the Pacific ring of fire.
2. They are usually associated with convergent plate boundaries.
3. Emperor seamount in the Pacific Ocean is known to be formed due to hotspot volcanic activity.

Which of the statements given above are incorrect?

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

Ans: a (1 and 2 only)

**Statement 1 is incorrect:** Some chains of volcanoes lie within the interiors of tectonic plates rather than along the edges. The volcanoes are progressively older away from the largest and most active volcano. A hotspot is a large plume of hot mantle material rising from deep within the Earth. A line of volcanoes develops as a plate moves over a hotspot, much as a line of melted wax forms as a sheet of waxed paper is moved slowly over a burning candle. Hence Hotspot volcanoes are not associated with Pacific Ring of Fire.

**Statement 2 is incorrect:** Volcanism in central parts of plates beyond constructive and destructive margins is not common, but it can be explained as the surface expression of local thermal variation or hot spots in the mantle. Hotspots are places within the mantle where rocks melt to generate magma. The presence of these hotspots is inferred by anomalous volcanism, i.e., not at the plate boundary.

**Statement 3 is correct:** The Hawaiian Islands were formed by a hot spot in the middle of the Pacific Plate. While the hot spot itself is fixed, the plate is moving. So, as the plate moved over the hot spot, the string of islands that make up the Hawaiian Island chain formed. The Hawaiian Islands form an archipelago extending over a vast North Pacific Ocean area. The archipelago is made up of 132 islands, atolls, reefs, shallow banks, shoals, and seamounts stretching over 1,500 miles from the island of Hawaii in the southeast to Kure Atoll in the northwest.

16. Consider the following statements about Atmospheric Phenomenon

1. The temperature and humidity in an air mass are uniform and hardly any fall in temperature is noticed with increasing altitude.
2. When contrasting air mass meets, it can result in the formation of Tornadoes.
3. The wind velocity in a tropical cyclone is higher than that of a temperate cyclone
4. Occluded front are formed when air mass is fully lifted above the land surface

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is incorrect:** An air mass is a large volume of air in the atmosphere that is relatively uniform in temperature and moisture. The fall in temperature is noticed in the layers of the Troposphere and Mesosphere with increasing altitude not in all layers of atmosphere

**Statement 2 is correct:** When winds move air masses, they carry their weather conditions (heat or cold, dry or moist) from the source region to a new region. When the air mass reaches a new region, it might clash with another air mass with a different temperature and humidity. This can create a severe storm or Tornadoes.

**Statement 3 is correct:** Tropical Cyclones have gale force winds with wind gusts over 90 km/h around their center. In the most severe cyclones, gusts can exceed 280 km/h and go to 1200kmph. These winds





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can cause extensive property damage and turn airborne debris into potentially lethal missiles. The wind velocity of a Temperate cyclone is only around 30- 150 kph. Hence, The wind velocity in a tropical cyclone is higher than the wind velocity of a temperate cyclone.

**Statement 4 is correct:** When two different air masses meet, the boundary zone between them is called a front. The process of formation of the fronts is known as frontogenesis.

There are four types of fronts: (a) Cold; (b) Warm; (c) Stationary; (d) Occluded.

When the front remains stationary, it is called a stationary front. When the cold air moves towards the warm air mass, its contact zone is called the cold front, whereas if the warm air mass moves towards the cold air mass, the contact zone is a warm front.

If an air mass is fully lifted above the land surface, it is called the occluded front.

The fronts occur in middle latitudes and are characterized by steep gradients in temperature and pressure. They bring abrupt changes in temperature and cause the air to rise to form clouds and cause precipitation

17. Consider the following statements about the origin and evolution of the Universe

1. The first galaxy was born immediately after the Big Bang
2. The Universe mostly remains the same at any given point in time
3. The space between the galaxies has been increasing since their origin
4. James Webb Space Telescope was launched to know the origin and evolution of universe

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is incorrect:** The first galaxies may have formed much earlier than thought. A new study suggests just 200 million years after the Universe's birth. Hence it is not formed immediately after the Big Bang. Using several different telescopes,

astronomers have discovered a distant galaxy whose stars appear to have formed 200 million years after the Big Bang, the explosive event that brought the Universe into being.

**Statement 2 is incorrect:** The Universe was born with the Big Bang as an unimaginably hot, dense point. When the Universe was just 10<sup>-34</sup> of a second or so old <sup>3</sup> that is, a hundredth of a billionth of a trillionth of a second in age <sup>3</sup> it experienced an incredible burst of expansion known as inflation. In that space, itself expanded faster than the speed of light. During this period, the Universe doubled in size (not remaining the same) at least 90 times, going from subatomic-sized to golf-ball-sized almost instantaneously. According to NASA, after inflation, the growth of the Universe continued, but at a slower rate. As space expanded, the Universe cooled and matter formed.

**Statement 3 is correct:** The galaxies are not moving through space; they are moving in space because space is also moving. In other words, the Universe has no center; everything is moving away from everything else. Suppose you imagine a grid of space with a galaxy every million light-years; after enough time passes, this grid will stretch out so that the galaxies are spread to every two million light years, and so on, possibly into infinity.

**Statement 4 is correct:** The James Webb Space Telescope is an infrared telescope known as the "Next Generation Space Telescope." Webb is an international collaboration between NASA, ESA (the European Space Agency), and the Canadian Space Agency (CSA). It was launched on December 25, 2021, on a mission to study the earliest stars and peer back farther into the Universe's past than ever before.

18. Consider the following statements about Earth Quakes

1. Both P and S waves travel through the body of the Earth
2. Surface waves or L waves are high frequency waves that travel through the crust
3. The magnitude of an Earthquake indicates the quantity of energy released by an earthquake at the source point, which is measured using the Mercalli Scale.



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4. The US Geological Survey is a responsible institution for measuring and assessing Earthquakes across the world

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is correct:** Earthquake waves are basically of two types <sup>3</sup> body waves and surface waves. There are two types of body waves, called P and S-waves. Body waves can travel through the interior of the Earth, but surface waves only move along the surface of the Earth like ripples on water. The P wave is the fastest kind of seismic wave and the first to arrive at a seismic station that can be recorded on the Seismograph. P waves can move through solid rock, liquids, and gases. P waves are "push and pull" waves like sound waves, which push and pull the air in each particle vibrating to and fro in the direction of propagation. These are also known as compressional or longitudinal waves.

The second type of body wave is the S wave or secondary wave, appearing only after the P waves have arrived. These are transverse or shear waves, in which the motion of each particle is at a right angle to the direction of propagation. S waves can pass only through solid rock and move rock particles up and down or side-to-side-perpendicular to the direction in which the wave travels.

**Statement 2 is incorrect:** Surface waves are of two types such as love waves and Rayleigh waves. Surface waves or L waves which travel through the crust are of lower frequency due to high amplitude than body waves. They arrive after body waves because of the complexity of their paths through crustal layers and can pass through land and water. These waves are responsible for the damage and destruction associated with Earthquakes. The speed of the surface waves and the related damages gets reduced in case of deeper Earthquakes.

**Statement 3 is incorrect:** The earthquake events are scaled according to the shock's magnitude or intensity. The magnitude scale is known as the Richter scale. The magnitude relates to the energy

released during the quake. The magnitude is expressed in absolute numbers, 0-10. The **intensity scale is named after Mercalli**, an Italian seismologist. The intensity scale takes into account the visible damage caused by the event. The range of intensity scale is from 1-12.

**Statement 4 is correct:** The U.S. Geological Survey is a responsible institution for measuring and assessing Earthquakes across the world. Under that, The National Earthquake Information Centre (NEIC), a part of the Department of the Interior, the U.S. Geological Survey, is the sole authority. The NEIC operates a 24- hour-a-day service to determine the location and magnitude of significant earthquakes in the United States and worldwide as rapidly and accurately as possible.

19. Consider the following statements

- 1. The volume of renewable water on Earth remains constant
- 2. Water available in Ice caps and Glaciers is nearly thrice the volume of Groundwater.

Which of the statements given above are correct?

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

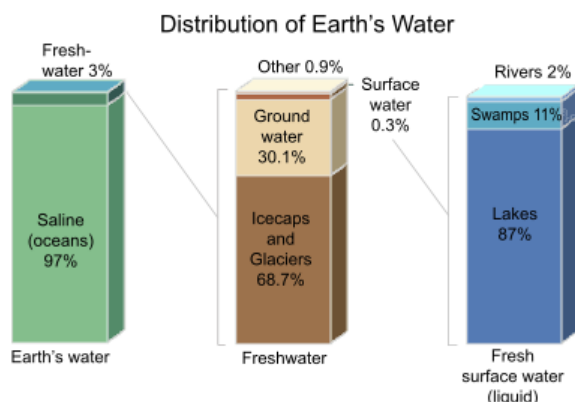
Ans: c (Both 1 and 2)

**Statement 1 is correct:** The amount of water on the Earth remains constant due to the water cycle. Its abundance only seems to vary because it is in constant motion, cycling through the oceans, the air, the land and back again through evaporation, precipitation and run-off. Because water is a renewable resource that can also be replenished by rain, the water remains constant on the Earth.

**Statement 2 is correct:** Earth's surface is covered with 29% land and 71% water. Water available in Ice caps and Glaciers is nearly 2 %, approximately equal to thrice of the volume of Groundwater. (3\*0.6=1.8%). Almost 70% of freshwater can be found in glaciers and ice caps, and 30% of freshwater is found in Groundwater, rivers and lakes.

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20. Consider the following statements

1. Jet streams are special types of geostrophic winds that are predominantly westerly winds.
2. Geostrophic winds are caused by Coriolis force, frictional force and pressure gradient forces
3. The speed of the wind is depend on pressure gradient force and frictional force

Which of the statements given above are correct?

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

Ans: b (1 and 3 only)

**Statement 1 is correct:** Jet streams are relatively narrow bands of strong wind in the upper levels of the atmosphere. The winds blow from west to east in jet streams, but the flow often shifts to the north and south. Jet streams flow west to east in both the hemispheres; hence, they are called Westerlies or upper-level Westerlies.

**Statement 2 is incorrect:** Geostrophic winds are the horizontal wind in the upper atmosphere that moves parallel to isobars. These winds result from a balance between pressure gradient force and Coriolis force. Frictional force always acts opposite to air motion and reduces wind speed. Its greatest effect is near the earth's surface and rapidly decreases with height. This slowing causes the wind to be not geostrophic and, thus, slows down and reduces the Coriolis force, and the pressure gradient force becomes more dominant. Thus Geostrophic winds are caused only by the Coriolis force and the Pressure Gradient force and not by the Frictional force.

**Statement 3 is correct:** Pressure gradient force: The change in pressure across a given distance is called pressure gradient. The greater the difference in air pressure between the two points, the steeper is the pressure gradient and greater is the speed of the wind. Frictional force: It affects the speed of the wind. It is greatest at the surface and its influence generally extends upto an elevation of 1.

21. Consider the following statements

1. Indian Ocean dipole (IOD) is defined as differences in Sea Surface Temperature (SST) in the equatorial Indian Ocean similar to ENSO.
2. The Indian summer monsoon is affected by the Atlantic SST variability.
3. Positive IOD and negative Equatorial Indian Ocean Oscillation (EQUINOO) events bring more rainfall to India
4. Negative IOD gives more rainfall to Australia

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** IOD is the measurement of the difference between the sea surface temperature of eastern and the western Indian Ocean, i.e., between the Bay of Bengal and the Arabian Sea, which is much similar to ENSO, as ENSO is the condition of difference in sea surface temperature between the western and eastern Pacific Ocean.

**Statement 2 is correct:** The warming of the surface of the Atlantic Ocean weakens the Indian monsoon, and the cooling of the surface strengthens the Indian monsoon. This phenomenon is known as Atlantic Nino. Hence the Indian summer monsoon is affected by the Atlantic Sea Surface Temperature variability.

**Statement 3 is incorrect:** EQUINOO was defined as 'oscillation' or a 'seesaw' between the enhanced cloud formation and rainfall over the western equatorial Indian Ocean (WEIO) (covering 50° E to 70° E and 10° S to 10° N) and suppressed clouding over the eastern equatorial Indian Ocean (EEIO) (covering 90° E to 110° E and 10° S to Equator) in the west of

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Sumatra. When the surface sea temperature in WEIO is above 27.5 degrees Celsius, it is called a positive EQUINOO phase (the vice versa is called the Negative EQUINOO). This leads to enhanced clouding, which is then suppressed in the eastern equatorial Indian Ocean. This increased cloud formation throughout this monsoon season is the main reason for the above-average rainfall in India. Thus, Positive IOD and Positive EQUINOO produce good rainfall in India.

**Statement 4 is correct:** IOD is the measurement of differences between the sea surface temperatures of the western and eastern parts of the Indian Ocean, i.e., The Arabian Sea and the Bay of Bengal. During negative IOD, the temperature of eastern Indian Ocean is more which provides more rainfall to Australia and less rainfall to India.

22. Consider the following pairs about different tectonic plates and their location

Tectonic Plate	Location
Caroline plate	Between Philippine and Indian plate
Nazca plate	Between Central America and the Pacific plate
Scotia plate	Between South Africa and the Antarctic plate
Cocos plate	Between South America and the Pacific plate

How many pairs given above are correctly matched?

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

Ans: a

**Pair 1 is correctly matched:** The Caroline plate is a minor tectonic plate that is present in the north of new guinea, which is bounded by the Philippine plate on its western margin and India and smaller plates along its southern side in New Guinea and the Bismarck sea.

**Pair 2 is incorrectly matched:** Nazca Plate is bounded by the Pacific plate on the west, the Antarctic plate on the south, and the South American plate on the east. Whereas it is not present between

the central American plate, which is the Caribbean plate and the pacific plate.

**Pair 3 is incorrectly matched:** The Scotia plate is a minor plate which is present in the Atlantic Ocean, which is bounded by the South American plate in the north and Antarctic Plate in the south. There is no such South African plate

**Pair 4 is incorrectly matched:** The Cocos Plate is bounded by several different plates. To the northeast, it is bounded by the North American Plate and the Caribbean Plate, which is a Central American plate. To the west, it is bounded by the Pacific Plate, and to the south by the Nazca Plate. Whereas it is not bounded by the South American plate.



23. This type of climate is found in the temperate regions of the world, and it is characterized by warm moist summers and cool, dry winters. The mean monthly temperature is between 40degrees F and 78 degrees F and has a strong maritime influence. The region has well distributed rainfall with thunderstorms in summer with the occasional occurrence of Tornadoes. The region exhibits monsoonal characteristics with more than 200 frost-free days, and the abundant moisture favours the cultivation of cotton and maize. On the highlands, conifers such as pines and cypresses are important softwoods. It is also called a slight monsoonal type of climate.

Which one of the following types of climate best describes the above passage?

- (a) Laurentian type climate
- (b) British type climate
- (c) Gulf type climate
- (d) Steppe type climate

Ans: c (Gulf type climate)



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**Explanation:** Warm moist summers with cool and dry winters are the characteristics of a Temperate west margin climate whose mean monthly temperature is between 40degrees F and 78 degrees F. Since it is experienced in the continental margins, there is always an influence of the sea (maritime influence). Temperate west margin climates have 3 subtypes: China, Gulf, and Natal. During winters, due to the extension of the polar cell towards the south, there will be penetration of extremely cold winds to the continental interiors which, when contracts highly contrasting maritime hot air mass near the shorelines, causes Tornadoes in the USA. There is a seasonal reversal of winds which makes them experience a monsoonal climate; however, since there is no complete reversal of winds relative to the China type of climate, this is called a Slight monsoonal type of climate. The monsoonal climate provides enough moisture supply, and under the influence of maritime air mass, these areas will be frost free and thus favours the cultivation of crops like cotton and maize. Coniferous trees such as pines, firs, cedars and cypresses also grow in these regions. The above type best explains Temperate west margin climates in areas like the south-eastern U.S.A.

**Additional information:**

**Laurentian type of climate:** It is also called the Cool temperate Eastern Margin Climate. It has cold, dry winters and warm, wet summers with winter temperatures below freezing point and warm Summer temperatures with heavy rainfall of annual precipitation between 30 to 60 inches.

**British type climate:** British Climate, Cool Temperate Western Margin Climate, or North-West European Maritime Climate are all terms used to describe the climate of the United Kingdom. The cool temperate western margins are influenced by the Westerlies all year.

**Steppe type climate:** Steppe or Temperate Grasslands refers to a semi-desert region with grassland or shrub vegetation. Steppes are intermediate regions, not receive enough rainfall to support a forest but are also not as dry as a desert.

24. Consider the following statements about corals

1. Corals survive only in warmer tropical and subtropical latitudes
2. Polyps along fringing reefs will die immediately once the water recedes during earthquakes.
3. The corals are best developed on the inner aspect of Atolls due to less disruption by ocean currents.
4. Corals are generally absent on western margins of continents due to presence of hot surface water

How many statements given above are incorrect?

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

Ans: d (All four)

**Statement 1 is incorrect:** Coral reefs are found in Tropical, Sub Tropical, Temperate and polar regions. Also, corals are found across world oceans, in both shallow and deep waters, but reef-building corals are only found in shallow tropical and subtropical waters. This is because the algae found in their tissues need light for photosynthesis, and they prefer water temperatures between 70-85°F (22-29°C). Deep-sea corals do not have the same algae and do not need sunlight or warm water to survive, but they also grow very slowly.

**Statement 2 is incorrect:** Coral polyps are tiny little animals related to anemones and jellyfish, and they can live individually or in large colonies that comprise a coral reef. Polyps can survive without water for a considerable amount of time but not for a longer period. Earthquakes can move large sections of coral reefs above sea level or deeper below water, which can cause a coral reef avalanche. When the water recedes during an earthquake, polyps survive for some time and won't die immediately.

**Statement 3 & 4 are incorrect:** Ocean Currents play a major role in the formation of Coral reefs. Coral reefs require nearly 70-85°F (22-29°C) warm temperature. Coral reefs shall not flourish in the regions of cold currents because the upwelling of cold water from the depth cools the warm surface, which does not favor the growth of coral reefs. Thus, generally, coral reefs are absent on the western



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margin of the continents because of the presence of cold currents.

25. Consider the following statements

1. Aphelion is the position at which the Earth is at its farthest from the Sun
2. The Earth is at Aphelion in the early month of July, which is 152 million km away from the Sun.
3. Being farthest from the Sun, the Earth experiences a significant drop in temperature
4. The varying distance between the Sun and the Earth does not cause seasons

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** During the Earth revolution around the sun in its elliptical orbit distance between the Sun and the Earth varies throughout the year. Aphelion is the position at which the Earth is at its farthest approach to the Sun, and Perihelion is the position at which the Earth is at its closest approach to the Sun.

**Statement 2 is correct:** The position of Earth at Aphelion falls on 4th July 2022 and at that position distance between the Earth and the Sun is 152 million km. The position of Earth at Perihelion falls on 3rd January and at that position distance between the Earth and the Sun is 147 million km.

**Statement 3 is incorrect:** Though Earth is at its farthest position on the 4th of July, this distance does not have a significant impact on the temperature of the Earth. Though annual insolation received by the earth on 3rd January is slightly more than the amount received on 4th July, this does not have a great effect on daily weather changes on the surface of the earth.

**Statement 4 is correct:** A common misconception is that Earth's varying distance from the Sun causes the four seasons. The 23.5-degree tilt of our planet's spin axis is more important. The tilt of the north pole toward the Sun in June causes summer north of the equator, while during summer, south of the equator comes six months later when the south pole is facing

the Sun. The ellipticity of Earth's orbit does cause a small change in solar heating from July (aphelion) to January (perihelion), even though it is not the dominant factor but acts as one of the factors in shaping seasonal weather patterns.

26. Consider the following statements

1. Ocean surface Salinity affects the water cycle and ocean circulation.
2. The annual range of temperature of ocean surface water decreases with latitude from the equator towards the poles
3. Salinity over tropics is relatively low
4. Abyssal zone has zero oxygen

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** Salinity is generally defined as the salt concentration (e.g., Sodium and Chlorine) in sea water. It varies due to evaporation and precipitation over the ocean, river runoff, and ice melt. Along with temperature, Ocean Surface Salinity plays a major role in the changes in the density of sea water which results in changes in the water cycle and ocean circulation

**Statement 2 is incorrect:** The Range of temperature is defined as the difference between the maximum and minimum temperatures or between the highest and lowest mean temperatures during a specified time interval, for example, daily, monthly, or seasonal. The average temperature of surface water of the oceans is about 27°C and gradually decreases from the equator towards the poles. The rate of decrease of temperature with increasing latitude is generally 0.5°C per latitude. Whereas the Annual range of temperature from the equator towards the poles increases

**Statement 3 is correct:** The higher temperature in the tropics makes evaporation very high. Still, the salinity over the tropic was relatively low due to higher rainfall, higher relative humidity, and a supply of fresh water. The average salinity is 35%.



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**Statement 4 is correct:** As in the abyssal zone, there is no light, there are no plants growing in this zone, thus no oxygen is being produced. Oxygen minutely only comes from the ice that had melted long ago from the polar regions. The water on the seafloor of this zone is actually devoid of any oxygen content.

27. Consider the following statements about Mid-Oceanic Ridges

1. Mid-oceanic ridges are continuous mountain ranges that occur along convergent plate boundaries.
2. Mid-oceanic ridges are much younger than continental areas.
3. Mid-Atlantic ridges do not create Rift Valley in the Atlantic Ocean because it spreads quickly
4. Mid-oceanic ridges resulted in creation of new land masses

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is incorrect:** Mid-ocean ridges occur along divergent plate boundaries, where a new ocean floor is created as the earth tectonic plates spread apart. As the plates separate, molten rock rises to the seafloor, producing enormous volcanic eruptions of basalt. It is the most extensive chain of mountains on Earth, stretching nearly 65,000 kilometers (40,390 miles) and with more than 90 percent of the mountain range lying underwater in the deep ocean.

**Statement 2 is correct:** As old oceanic crust is subducted and melted into magma, new oceanic crust in the form of igneous rock is formed at mid-ocean ridges and volcanic hotspots. This recycling accounts for the recycling of 60 percent of Earth's roughly the same age. Because of this recycling, the age of the oceanic crust varies depending on location. Areas where new crust is formed at mid-ocean ridges, are much younger than zones further away. By contrast, continental crust is rarely recycled and is typically much older.

**Statement 3 is incorrect:** The Mid-Atlantic Ridge runs down the center of the Atlantic Ocean, slowly spreading at a rate of 2 to 5 centimeters (0.8 to 2 inches) per year and forming a rift valley that is about the depth and width of the Grand Canyon. In contrast, the East Pacific Rise is spreading quickly, at rates of 6 to 16 centimeters (3 to 6 inches) per year. Due to the fast-spreading rates, there is no rift valley in the Pacific, just a smooth volcanic summit with a crack along the crest that is much smaller than the Atlantic rift valley.

**Statement 4 is correct:** Seafloor spreading is a geological process that creates crusts, Earth's outermost shell. Tectonic plates separate, allowing magma from the earth's interior to fill the gap in this phenomenon. The magma cools to form a new oceanic crust. These activities occur along mid-ocean ridges large mountain ranges rising from the ocean floor thus resulted in the formation of new land forms.

28. Consider the following statements

1. The halocline is an ocean layer where salinity changes most rapidly with depth.
2. Pycnocline refers to the rapid change in density with depth.
3. The Arabian Sea experiences less salinity than the Bay of Bengal due to the influence of the southwest monsoon
4. No living creatures can be found in anoxic zone

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is correct:** Halocline, a vertical zone in the oceanic water column in which salinity changes rapidly with depth, is located below the well-mixed, uniformly saline surface water layer. Especially well-developed haloclines occur in the Atlantic Ocean, in which salinities may decrease by several parts per thousand from the base of the surface layer to depths of about one kilometer (3,300 feet).

**Statement 2 is correct:** Pycnoclines, or layers through which water density increases rapidly with



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depth, accompany such haloclines as much as density varies directly with total salt content.

**Statement 3 is incorrect:** The salinity in the Bay of Bengal is low due to the influx of river water. On the contrary, the Arabian Sea shows higher salinity due to high evaporation and a low influx of fresh water

**Statement 4 is incorrect:** With no dissolved oxygen to sustain animals or plants, ocean anoxic zones are areas where only microbes suited to the environment can live. With no dissolved oxygen to sustain animals or plants, ocean anoxic zones are areas where only microbes suited to the environment can live.

29. Consider the following statements about Atlantic Meridional Overturning Circulation (AMOC)

1. Atlantic meridional overturning circulation distributes heat and energy from the equatorial to the polar region
2. AMOC is driven by thermohaline differences.
3. North Atlantic drift alone decreases the severity of winter in Western Europe.
4. Climate change weakens the AMOC

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 & 2 are correct:** The AMOC is a large system of ocean currents, like a conveyor belt, driven by differences in temperature and salt content. As warm water flows northward, it cools, and some evaporation occurs, which increases the amount of salt. Low temperature and a high salt content make the water denser, and this dense water sinks deep into the ocean. The cold, dense water slowly spreads southwards, several kilometers below the surface. Eventually, it gets pulled back to the surface and warms in a process called upwelling and the circulation is complete. This global process makes sure that the world oceans are continually mixed and that heat and energy are distributed around the earth.

Note: Thermohaline means involving or dependent upon the conjoint effect of temperature and salinity. Thus, driven by thermohaline difference, AMOC transfers heat and energy all over the world's ocean

surface (including from equatorial region to Polar regions).

**Statement 3 is incorrect:** The Gulf Stream is divided into many branches at 45° N latitude and 45°W longitude. All the branches are collectively called North Atlantic Drift or current. North Atlantic Current, also called North Atlantic Drift, is a warm western boundary current in the Atlantic Ocean that extends the Gulf Stream north eastward. The warm stream and the prevailing westerly winds help to keep the temperature in north western Europe moderate. North Atlantic drift hot waters help moderate Western Europe's climate, resulting in milder winters. Since both the events are disjoint and not jointly responsible for mild winters in Europe.

**Statement 4 is correct:** Atlantic Meridional Overturning Circulation (AMOC) is losing its stability. IPCC report indicates that AMOC has already weakened as greenhouse gases increased. This is because as the atmosphere warms, the surface ocean beneath it retains more of its heat. Meanwhile, increases in rainfall and ice melt mean it gets fresher too. All these changes make the ocean water lighter and reduce the sinking in the 'conveyor belt,' leading to a weaker AMOC.

30. Consider the following statements

1. Uranus and Neptune are called the Twin Planets of our Solar system.
2. Jupiter's moon Ganymede is the largest moon in our solar system, bigger than the Pluto
3. Venus is the hottest planet in our solar system
4. Saturn has highest number of moons in our solar system

How many statements given above are correct?

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

Ans: d (All four)

**Statement 1 is correct:** The size, mass, composition and rotation of Uranus and Neptune are so similar that they are often called planetary twins.

**Statement 2 is correct:** Jupiter is the fifth planet from our Sun and is, by far, the giant planet in the solar system. Jupiter's four largest moons <sup>2</sup> Io, Europa,





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Ganymede, and Calisto, were first observed by the astronomer Galileo Galilei in 1610. These four moons are known today as the Galilean satellites. Jupiter's moon Ganymede is the solar system's largest satellite (even bigger than the planet Mercury). Larger than Mercury and Pluto.

**Statement 3 is correct:** Venus, the second planet from the sun, is the hottest and brightest planet in the solar system. Venus is the hottest and brightest planet in the solar system and the brightest planet in the night sky. Venus is the same temperature at all times, day or night, at an average of 735 Kelvin (462 °C / 863 °F), making it even hotter than Mercury.

**Statement 4 is correct:** Saturn has regained its crown as the planet with the most moons in the solar system, just months after being overtaken by its fellow gas giant Jupiter. The leap-frog comes after the discovery of 62 new moons of Saturn, bringing its official total to 145

31. Falkland Island recently seen in news is a disputed area between

- (a) Brazil and Argentina
- (b) UK and Argentina
- (c) Brazil and UK
- (d) Brazil and Paraguay

Ans: b (UK and Argentina)

**Explanation:** The Falkland Islands is an archipelago in the South Atlantic Ocean on the Patagonian Shelf of Atlantic Ocean. For these islands, over two centuries, conflicts followed between Argentina and Britain with both asserting dominance over the other, alternatively finding victory in the conflict. That ended in 1840 when the Falklands became a Crown colony and Britain sent Scottish settlers to officially establish a community, one that was largely pastoral. Strategically, the Falkland Islands were important to Britain and that was evident in how they were used by London as a military base in the South Atlantic Ocean, both during the First and Second World Wars. However, following the end of the Second World War, the islands once again became a cause of dispute between the United Kingdom and Argentina, with both asserting sovereignty over the islands.

32. Identify the features that result to solar and lunar eclipses

- 1. Revolution of the moon around the Earth close to the Earth's ecliptic plane
- 2. The proximity between the moon and the Earth
- 3. The relative apparent size of the Sun and the moon

Which of the statements given above are correct?

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

Ans: d (1,2 and 3)

**Statement 1 is correct:** The plane of the moons orbit is nearly plane of the ecliptic. The inclination angle of the Moon's orbit to the plane of the earth's ecliptic is 5 degrees. Because of this minor inclination difference, they appear to be in the nearly same plane, which helps to form an eclipse (to shield other objects)

**Statement 2 is correct:** Solar and lunar eclipses occur because of the changing positions of the Earth, sun and Moon in relationship to one another. A solar eclipse occurs when the Moon passes between the Sun and Earth, fully or partially casting the Moon's shadow on Earth. A solar eclipse can only happen during a New Moon. The varying distances of the Moon from the Earth cause different types of solar eclipses like Annual, Partial, and Total Solar eclipses etc. When the Moon is closer to the Earth, it has a greater chance of fully covering the sun than when it is farther away.

A lunar eclipse occurs when the Earth passes between the sun and the Moon during a full moon phase. For this to happen, the Earth must be physically between the Sun and Moon, with all three bodies lying on the same plane of orbit.

Thus, the Proximity (the state of being near to somebody/something in distance or time) between the Earth and the moon is such that the shadow of one can hide the other object leading to the formation of the eclipse and thus is the responsible factor for the occurrence of Solar and Lunar eclipses.

**Statement 3 is correct:** The angular diameter of an object is the angle the object makes (subtends) as seen



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by an observer. This is demonstrated in the diagram below, where the angular diameter of the object appears larger to an observer at A (closer to the object) than to an observer at B. Angular diameter can also refer to the distances between two objects measured on the celestial sphere.

For an observer on the Earth, the angular diameter of the Moon and the Sun are quite similar. In reality, the Sun's physical diameter is 400 times bigger than the Moon, while the Moon is ~ 400 times closer to the Earth. This apparent (appears to be) size of the sun and moon (which appears to be quite similar) through which one's shadow can shield the other completely is thus, one of the factors for forming an eclipse.

33. Consider the following statements

1. Mesopause is the coldest place in Earth's atmosphere
2. Halogens are less reactive in the ozonosphere.
3. The Karman line is located beyond the Thermosphere, the place where space begins
4. In the mesosphere, temperature increases with an increase in altitude.

How many statements given above are correct?

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

Ans: a (Only one)

**Statement 1 is correct:** The mesosphere (meaning "middle sphere") is the third layer in our atmosphere, occupying the region 50 km to 80 km above the surface of the Earth, above the troposphere and stratosphere, but below the thermosphere. Because of its altitude, the air is a lot thinner in the mesosphere than in the stratosphere below. There are fewer air molecules to absorb incoming electromagnetic radiation from the Sun. In the mesosphere, the thin air and small amounts of ozone prevent the air from warming much. Carbon dioxide in the mesosphere also helps keep this layer cold. CO<sub>2</sub> molecules absorb heat energy when they bounce off of other molecules. The CO<sub>2</sub> releases some of that energy as photons in a process called "radiative emission". Some of those photons travel upwards, carrying heat away from the mesosphere. Thus, temperature in the mesosphere

keeps dropping with increase in altitude until it reaches about -100°C. The mesosphere is the coldest of the atmospheric layers. In fact it is colder than the Polar regions of the Earth - cold enough to freeze water vapor into ice clouds.

**Statement 2 is incorrect:** Reactive gases containing the halogens chlorine and bromine lead to the chemical destruction of stratospheric ozone.

The source gases are emitted at Earth's surface by natural process and human activities. Halogen source gases (also known as ozone-depleting substances) are chemically converted to reactive halogen gases primarily in the stratosphere. Once in the stratosphere, the halogen source gases chemically convert at different rates to form the reactive halogen gases. The conversion occurs in the stratosphere instead of the troposphere because solar UV radiation is more intense in the stratosphere. The reactive gases separate into reservoir gases, which do not destroy ozone, and reactive gases, which participate in ozone destruction cycles.

**Statement 3 is incorrect:** The line that marks the beginning of space from the Earth is called the Karman line. It is named after Theodore von Karman, the Karman line is a crucial element that is considered while determining the extent to which an aircraft can fly. The Karman line is located at roughly 62 miles (100 kilometres) above sea level. It is believed that space starts after the Karman line. It is marked by analysing the density of air. At the Karman line, the air becomes too thin for aircraft to stay afloat. But interestingly, this is not where Earth's atmosphere ends. It exists between Earth's Mesosphere and Thermosphere

**Statement 4 is incorrect:** In the mesosphere, temperature decreases as altitude increases due to decreasing solar heating and increasing cooling by CO<sub>2</sub> radiative emission.

34. Consider the following statements

Statement 1: Cyclone are absent near the equator despite high temperature and moisture

Statement 2: Coriolis force near the equator is zero

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



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- (a) Both statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
- (b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
- (c) Statement-I is correct but Statement-II is incorrect
- (d) Statement-I is incorrect but Statement-II is correct

Ans: a (Both statement I and statement II are correct and statement II is the correct explanation for statement I)

**Statement 1 is correct:** Cyclones are absent near the equator despite high temperature and moisture

**Statement 2 is correct:** Favourable conditions for the formation of cyclones are

- Availability of continuous supply of warm and moist air
- Average surface water temperature is 27°C
- A pre-existing near-surface disturbance.
- There should be anticyclone circulation at the height of 9km to 15 km
- Presence of strong Coriolis force

Even if these conditions are in place, a tropical cyclone is not likely to form between 5°N and 5°S of the equator. This is because of the lack of the Coriolis force, which is caused by the rotation of the Earth. The Coriolis force is zero at the equator and negligible between 5°N and 5°S of the equator. The Coriolis force is necessary for forming a cyclone because only this force makes the strong convective current, the source of cyclone formation, move rapidly round and round.

35. Why are the Major hot deserts in the northern Hemisphere located between 20-30 degrees north and on the western side of the continents?

1. The incidence of warm currents along the western coastal regions causes the onshore winds dry.
2. The relative humidity is extremely high, making condensation almost impossible.

Which of the statements given above are correct?

- (a) Only 1
- (b) Only 2

(c) Both 1 and 2

(d) Neither 1 nor 2

Ans: d (Neither 1 nor 2)

**Explanation:** The presence of cold ocean currents on the western side of the continents between 20-30 degrees north is one of the main causes of the formation of hot deserts. When there is a cold current along the western shore, the air moving from sea to land will be dry, which decreases its water vapor-holding capacity. This results in a decrease in the relative humidity of the air. This makes these areas unfavorable for precipitation. Hence deserts are formed along the western coastal regions.

Relative humidity (RH) measures how much water vapor is in a water-air mixture compared to the maximum amount possible. Warm air can possess more water vapor (moisture) than cold air.

36. Consider the following statements about Frontogenesis and Temperate cyclones

1. Mid-latitude cyclones or temperate cyclones occur due to cold fronts.
2. Direction of mid-latitude cyclones is influenced by Jet streams
3. Occluded clouds are associated with extra-tropical cyclones
4. Cumulus clouds develop along cold fronts

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is incorrect:** A front is formed when two contradicting conditions meet, so a cyclonic condition formed due to the formation of the front cannot be associated only with a cold front. Mid-latitude is an area of convergence of different air masses, and thus it leads to the formation of fronts and cyclonic conditions are bound to happen. The air masses involved in the formation of Temperate cyclones are of two types warm and cold; two types of fronts with distinct characteristics are formed in the process of marching forward and getting interacted with each other. Later the intermingling of the two give birth to another known as the occluded front.



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**Statement 2 is correct:** Jet streams also influence the path of temperate cyclones. Since the temperate cyclones are developed in the mid-latitudes areas where the westerlies are prominently blowing, the direction is generally from west to east.

**Statement 3 is correct:** The Extra-Tropical Cyclones are storm systems emerging in the mid and high latitudes, away from the tropics. They are low-pressure systems with associated cold, warm, and occluded fronts. The air masses involved in the formation of Temperate cyclones are of two types <sup>2</sup> warm and cold; two types of fronts with distinct characteristics are formed in the process of marching forward and getting interacted with each other. Later, the intermingling of the two gives birth to another known as <sup>2</sup> the occluded front.

**Statement 4 is correct:** These extra tropical cyclones circulation results in a well-built a cold and warm front. There are pockets of warm air compressed between the forward and the rear cold air. The warm air climbs over the cold air, and a series of clouds appear over the sky ahead of the warm front and cause rainfall. The cold front approaches the warm air from behind and pushes the warm air up. As a result, cumulus clouds develop along the cold fronts.

37. Consider the following statements about equatorial type of climate

1. The annual range of temperature is high due to the direct incidence of sun rays in the equatorial region
2. Unlike temperate forests, tropical hardwoods are very strong which are widely used in boat-making industries
3. The equatorial region experiences peak rainfall during the months of April and October
4. The equatorial type of grassland found in Amazon lowlands is referred to as "selvas."

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is incorrect:** Equatorial Climatic regions experience fairly constant climates, with abundant rainfall, high humidity and temperatures throughout the year. Because of these factors, the annual temperature range (Difference between Maximum and Minimum temperature in a year) is minimum over the equator. The difference is so small, around 2oF for an Equatorial Climate

**Statement 2 is incorrect:** Tropical wood trees are too heavy to float in water, and the absence of snow does not favor Logging conditions, which is why temperate woods are preferred over them for boat building.

**Statement 3 is correct:** Though Precipitation is spread throughout the year, there are two periods of Maximum rainfall, which are after the Equinoxes (April and October) and the least rainfall during the Solstices (June and December). The double rainfall coinciding with equinoxes is characteristic of Equatorial Climate only.

**Statement 4 is correct:** Tropical Grasslands are known by different names around the world, which in Equatorial regions are known as Selvas (Amazon Basin).

38. Due to climate change dam-like structure is a proposed solution to the problem of rising water levels in the North Sea. Consider the following statements about the North Sea

1. Because of the low rate of evaporation and the addition of fresh water, the North Sea has low salinity
2. The North Sea is linked with the Baltic Sea by the strait of the Skagerrak.
3. It is surrounded by Germany, Denmark, Belgium, Luxemburg, Netherland, and Norway

Which of the statements given above are incorrect?

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

Ans: b (1 and 3 only)

**Statement 1 is incorrect:** Even though the North sea has a low evaporation rate which is because of higher latitudes, and it is fed by large river systems like the

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Thames, Rhine, and the Elbe, it shows higher salinity because of the North Atlantic Drift Current, which is a wind-driven surface movement of warm water. It transports warm waters to latitudes higher than any other ocean, producing the moderate climate of Europe and western Scandinavia. Salinity at the surface increases by the loss of water to ice or evaporation or decreased by the input of fresh waters, such as from the rivers. Thus the North Sea shows higher salinity, not less salinity.

**Statement 2 is correct:** The North Sea is linked with the Baltic Sea by the Skagerrak and the Kattegat strait.



**Statement 3 is incorrect:** The sea is bordered by the island of Great Britain to the southwest and west, the Orkney and Shetland islands to the northwest, Norway to the northeast, Denmark to the east, Germany and the Netherlands to the southeast, and Belgium and France to the south. Whereas it is not surrounded by Luxemburg.

39. Consider the following statements about Heat Domes

1. A heat dome is an area of high pressure that traps heat over a region.
2. Heat dome is mostly formed during La Nina when waters are warm in the Eastern Pacific and cold in the western Pacific
3. Heat domes are stationary, and they last for a few days to a week or two

How many statements given above are correct?

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

(d) None

Ans: a (Only one)

**Statement 1 is correct:** A heat dome occurs when a persistent high-pressure region traps heat over an area. Typically, heat domes are tied to the behavior of the jet stream, a band of fast winds high in the atmosphere that generally runs west to east. Normally, the jet stream has a wavelike pattern, meandering north, then south, and then north again. When these meanders in the jet stream become bigger, they move slower and can become stationary. That's when heat domes can occur.

**Statement 2 is incorrect:** When strong, high-pressure atmospheric conditions combine with influences from La Nina, it creates vast areas of sweltering heat that get trapped under high pressure, leading to the formation of Heat domes. But La Nina conditions are not because of warmer eastern pacific and colder western pacific but rather the other way around (Warmer western pacific and colder Eastern Pacific)

**Statement 3 is incorrect:** Heat domes normally persist for several days in any one location, but they can last longer. They are not stationary; they can also move, influencing neighboring areas over a week or two. For example, A Heat dome that occurred in the USA in June 2022 crept eastward over time.

40. Consider the following lakes

1. Lake Michigan
2. Sea of Galilee
3. Lake Titicaca
4. Lake Nyasa
5. Lake Chad
6. Lake Balkhash

How many of above lakes share an international border?

- (a) Only two
- (b) Only three
- (c) Only four
- (d) Only five

Ans: c (Only three)

**Statement 1 is incorrect:** Lake Michigan is the third largest of the five Great Lakes of North America and the only one lying wholly within United States. So, it does not share any international border



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**Statement 2 is incorrect:** The sea of Galilee is a lake in Israel through which the Jordan River flows. From 1948 to 1967, it was bordered immediately to the northeast by the cease-fire line with Syria. It doesn't share any international boundary.

**Statement 3 is correct:** Lake Titicaca is the world's highest lake navigable to large vessels above sea level in the Andes Mountains of South America, astride the border between Peru to the west and Bolivia to the east. So, it shares an international boundary between Peru and Bolivia.

**Statement 4 is correct:** Lake Nyasa, also called Lake Malawi, is the third largest of the Eastern Rift Valley lakes of East Africa, which lies in a deep trough mainly within Malawi. But it also shares boundaries with Tanzania and Mozambique.

**Statement 5 is correct:** Lake Chad is a freshwater lake located in the Sahelian zone of west-central Africa in conjunction with Chad, Cameroon, Nigeria, and Niger.

**Statement 6 is incorrect:** Lake Balkhash is a lake situated in east-central Kazakhstan. The lake is situated east of the Aral Sea. It doesn't share any international boundary.

41. Consider the following countries about Danube River

1. Slovenia
2. Croatia
3. Serbia
4. Moldova
5. Bosnia and Herzegovina

How many of the above countries did Danube River is flowing?

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

Ans: c (Only three)

Explanation: The Danube is the second-longest river in Europe, after the Volga. River Danube origins in the Black Forest mountains of Germany and drains into the Black Sea. It flows through much of Central and Southeast Europe and then passes through Croatia, Serbia, Bulgaria, Romania, Moldova, and Ukraine.



42. What is/are the possible impact of the convergence of the Labrador current and gulf stream?

1. Chance of higher fish catch in this zone
2. Chances of the accident of the boats due to a reduction in the visibility

Which of the statements given above are correct?

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

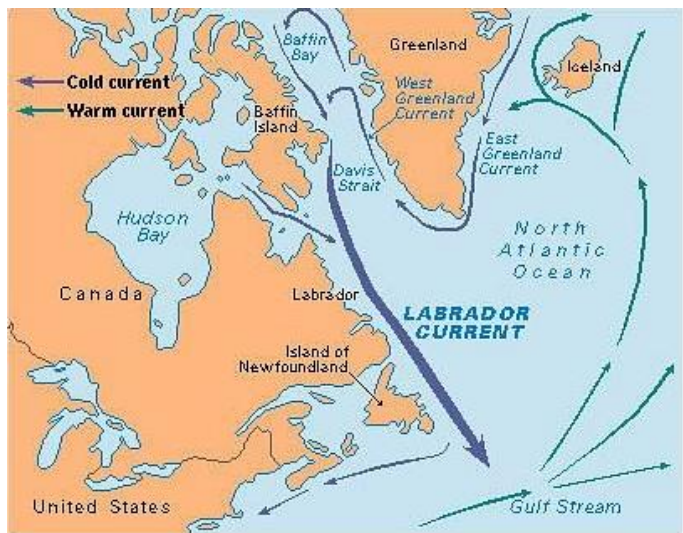
Ans: c (Both 1 and 2)

**Statement 1 is correct:** The cold Labrador current and the warm Gulf Stream meet in the Grand Banks, an area with the most productive fisheries in the world. This area is noted as an international fishing ground. This is because of the mixing up of warm and cold currents, which replenish the oxygen and favor plankton growth. These planktons are the primary food for the fish population. Hence the chance of fish caught in this zone is high.

**Statement 2 is correct:** The convergence of the warm Gulf Stream and cold Labrador Current near Newfoundland causes inversion of temperature, which results in the formation of dense fog that affects visibility and hinders sea transport. Due to this, there is a chance of boat accidents. So this area is known as the "Graveyard of Atlantic"

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killed hikers, guides, and herders in a popular trekking region on October 15, 2014.

**Statement 3 is incorrect:** Many times, cold temperatures due to blizzards can cause frostbite or hypothermia, a drop in body temperature that can last for days after the storm has ended. In contrast, Hyperthermia, also known simply as overheating, is a condition in which an individual's body temperature is elevated beyond normal due to failed thermoregulation.

**Statement 4 is incorrect:** Blizzards are often seen in Himalayan region not in peninsular and Gangetic basin.

44. Consider the following statements about Interior of the Earth

1. Volcanic eruptions
2. Meteors
3. Mining and deep drilling projects
4. Seismic activities
5. Earth's magnetic field

How many of the above are the direct sources to know the interior of the Earth?

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

Ans: b (Only two)

**Explanation:** The direct sources of information regarding the interior of the earth are

- Volcanic eruption
- Mining and deep drilling projects

Indirect sources of information regarding the interior of the earth are

- Gravitation
- Magnetic field
- Seismic activity
- Meteors

45. Which of the following best describes the term 'Blue Blob'?

- (a) It is the new technology for harnessing electricity from ocean water.
- (b) It is an area with the highest species density declared by the IUCN in ocean water
- (c) It is a cold patch formed in the Polar region

43. Consider the following statements about Blizzards

1. A blizzard is a severe storm condition with low temperature, strong winds and snow.
2. Blizzards can occur in tropical region.
3. Blizzard can cause hyperthermia by exposure to frigid temperatures.
4. Blizzards are common occurrence throughout India

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is correct:** The term blizzard describes a severe winter weather condition (violent snowstorm) characterized by strong winds, cold (low) temperatures, and reduced visibility due to falling or blowing snow lasting for a prolonged period typically at least three or four hours.

**Statement 2 is correct:** Blizzards occur when a mass of warmer air collides with a mass of very cold air. The cold air mass sinks under the warm air mass, and as the warm moist air rises upwards it forms snow and it falls. Blizzards occur worldwide, even in the tropics where it is cold on high-altitude mountain tops. In tropical region, Cold air is present in the higher altitude where cold air and warm air meets, resulting in the formation of Blizzards. Ex: A blizzard and avalanches in Nepal's Himalaya Mountains have



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(d) It is one of the conservation efforts by UNEP to save the ocean water ecosystem

Ans: c (It is a cold patch formed in the Polar region)

**Explanation:** The Blue Blob is a cold patch located south of Iceland and Greenland, a Polar region. This cold patch was most prominent during the winters when the sea surface temperature was about 1.4 degrees Celsius colder than usual.

According to new research, the "Blue blob," a region of cooling water in the North Atlantic Ocean near Iceland, may have temporarily slowed the melting of Arctic sea ice. The report also indicated that if temperatures are not controlled, the effects of climate change will catch up to the giant ice chunks.

46. Consider the following statements about Interior of the Earth

1. The continental crust is mainly granitic in nature and is denser than the Oceanic crust
2. The asthenosphere is the lowermost portion of the mantle and is the main source of magma
3. The outer core is in a liquid state, while the inner core is in a solid state
4. Inner core has highest density because it is made up of Nickel and Iron

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is incorrect:** Continental crust is broadly granitic in composition and, with a density of about 2.7 grams per cubic cm, is somewhat lighter than oceanic crust, which is basaltic (i.e., richer in iron and magnesium than granite) in composition and has a density of about 2.9 to 3 grams per cubic cm.

**Statement 2 is incorrect:** The portion of the interior beyond the crust is called the mantle. The upper portion of the mantle is called the asthenosphere. It is the main source of magma that finds its way to the surface during volcanic eruptions. The lower mantle extends beyond the asthenosphere. It is in a solid state.

**Statement 3 is correct:** The core comprises very heavy materials, mostly nickel and iron. The outer

core is in a liquid state, while the inner core is in a solid state because of intense pressure in the inner core that prevents the iron from melting. The pressure and density in this inner core are simply too great for the iron atoms to move into a liquid state.

**Statement 4 is correct:** The core is the innermost layer and has the highest density. It is made up mainly of nickel and iron. The mantle is the layer lying between the core and lithosphere. Its major constituents are silicon and magnesium.

47. Consider the following statements about Ozone layer

1. Generally, concentration levels of 220 Dobson Units or less are considered ozone depletion in the Stratosphere
2. Total ozone is generally highest at the equator and lowest in polar regions
3. The Montreal Protocol is a global agreement to protect the stratospheric ozone layer by phasing out ozone-depleting substances.
4. Solubility Ozone is higher than Oxygen

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** The Dobson Unit is the most common unit for measuring ozone concentration. One Dobson Unit is the value determined by measuring the concentration of ozone molecules in a column of air that extends from the Earth's surface to the top of the atmosphere is roughly 300 Dobson Units, equivalent to a layer 3 millimeters thick. Areas with values less than 220 Dobson Units are considered to have experienced severe ozone destruction.

**Statement 2 is incorrect:** The total amount of ozone above the surface of Earth varies with location on the time scales that range from daily to seasonal. The variations are caused by stratospheric winds, chemical production, and ozone destruction. Total ozone is generally lowest at the equator and highest near the poles because of the seasonal wind patterns in the stratosphere.





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**Statement 3 is correct:** The Montreal Protocol, finalized in 1987, is a global agreement to protect the stratospheric ozone layer by phasing out the production and consumption of nearly 100 man-made chemicals referred to as ozone-depleting substances (ODS). The Protocol is the only UN treaty ever that has been ratified by every country on Earth - all 198 UN Member States.

**Statement 4 is correct:** Ozone is an elemental molecule with the formula  $O_3$  that is in a gaseous state with blue color. At atmospheric pressure, it has a boiling point of  $-112^\circ C$ ; ozone can partially dissolve in water. At standard pressure and temperature, the solubility of ozone is thirteen times that of oxygen.

48. Consider the following statements

1. Weathering is a precondition for mass movements like landslides
2. Geomorphic agents do not cause mass movements.
3. Mass movements like mudflow and rockfall down the slope are due to the influence of gravity.
4. Large scale infrastructure projects can trigger mass movement

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is incorrect:** Weathering is the mechanical disintegration and chemical decomposition of rocks through the actions of various elements of weather and climate. Weathering is not a pre-requisite for mass movements like landslides though it aids mass movements. Mass movements are very active over weathered slopes rather than over unweathered materials.

**Statement 2 is correct:** Mass movements are aided by gravity, and no geomorphic agent like running water, glaciers, wind, waves and currents participate in the process of mass movements. That means mass movements do not come under erosion though there is a shift (aided by gravity) of materials from one place to another.

**Statement 3 is correct:** Mass movements transfer the mass of rock debris down the slopes under the direct influence of gravity. Mass movements may range from slow to rapid, affecting shallow to deep columns of materials and include creep, mudflow, earthflow, rockslide, landslide, and fall.

**Statement 4 is correct:** In recent times, large scale infrastructure projects are causing very frequent landslides and mass movement.

49. Consider the following geographical phenomenon

1. Denudation
2. Volcanic activity
3. Folding of crust
4. Deposition
5. Faults formation

How many of above are Endogenic processes?

- (a) Only one
- (b) Only two
- (c) Only three
- (d) Only five

Ans: c (Only three)

**Explanation:** The forces that act on the surface of the earth are called exogenic forces, and the forces that act in the interior of the earth are called endogenic forces. The landforms of the earth are a result of the endogenic and exogenic forces. The process of Endogenic process includes

- Volcanism
- Diastrophism includes the following
  - ✓ Orogenic processes involve mountain building through severe folding, affecting long and narrow belt of the Earth crust and faulting and fracturing the crust
- Epeirogenic process involve the uplift or warping of large parts of the earth's crust
- Earthquakes involving local relatively minor movements
- Plate tectonics involves horizontal movements of crustal plates.

The exogenic processes derive their energy from the atmosphere determined by the ultimate energy from the sun and also the gradients created by tectonic factors. All the exogenic geomorphic processes are covered under the general term denudation. The word



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denude means to strip off or to uncover. Weathering, mass wasting/movements, erosion, transportation, and deposition are included in denudation. Thus denudation and deposition are Exogenic forces and not Endogenic forces.

50. Consider the following statements

1. Aravalli is one of the oldest fold mountains in the world.
2. Unlike the Himalayas, the Rocky Mountains are formed by ocean-continent convergence.
3. Mt.Blanc is the highest peak in the Andes
4. Aravali's are part of Deccan plateau

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is correct:** Fold mountains are created where two or more Earth's tectonic plates are pushed together. At these colliding, compressing boundaries, rocks and debris are warped and folded into rocky outcrops, hills, mountains, and entire mountain ranges. The Aravallis are one of the world's oldest fold mountain chains and its ecological worth is immense. The 692-km Aravali range spans parts of Delhi, Haryana, Rajasthan, and Gujarat. The highest peak is Guru Shikar on Mount Abu at 1,722 meters (5,650 ft). The other old fold mountains are the Appalachians in North America and the Ural Mountains in Russia.

**Statement 2 is correct:** Typically, a convergent plate boundary which is a continental to continental one, between the Indian Plate and the Eurasian Plate, forms towering mountain ranges like Himalayas, as Earth's crust is crumpled and pushed upward. Whereas the Rocky Mountains are also formed by the convergent plate boundary but by the process of ocean-continent convergence through the Pacific and North American plates.

**Statement 3 is incorrect:** Aconcagua is the highest peak in the Andes Mountain range, Argentina. It is the highest mountain in the Americas, the highest outside Asia, and the highest in the Southern Hemisphere, with a summit elevation of 6,961 meters

(22,838 ft). Whereas Mount Blanc is the highest peak of the Alps and in Europe, reaching a lofty 4,804 meters (15,774 ft) above sea level.

**Statement 4 is incorrect:** Aravali's are not part of Deccan Plateau.

51. Consider the following statements about the factors controlling the nature and magnitude of tides

1. The shape of shoreline
2. Local winds and weather patterns
3. Changes in the position of the Sun and moon in relation to the Earth.
4. Uneven distribution of water over the globe

How many statements given above are correct?

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

Ans: d (All four)

**Statement 1 is correct:** The regular rise and fall of ocean waters are known as tides. Along coasts, the water slowly rises over the shore and then slowly falls back again. At a smaller scale, the magnitude of tides can be strongly influenced by the shape of the shoreline. When oceanic tidal bulges hit wide continental margins, the height of the tides can be magnified. Conversely, mid-oceanic islands not near continental margins typically experience very small tides of 1 meter or less.

**Statement 2 is correct:** Local wind and weather patterns also can affect tides. Strong offshore winds can move water away from coastlines, exaggerating low tide exposures. Onshore winds may act to pile up water onto the shoreline, virtually eliminating low tide exposures. High pressure systems can depress sea levels, leading to clear sunny days with exceptionally low tides. Conversely, low-pressure systems that contribute to cloudy, rainy conditions are typically associated with tides that are much higher than predicted.

**Statement 3 is correct:** Based on the Sun, Moon, and the Earth's Positions, the height of rising water (high tide) varies appreciably, which results in the formation of Spring tides and neap tides. Although the sun and moon both exert gravitational force on the



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Earth, the moon's pull is stronger because the moon is much closer to the Earth than the sun is.

**Statement 4 is correct:** Due to the uneven distribution of water over the globe, the tides are unable to move freely around the globe, and they establish complex patterns within each ocean basin that often differ greatly from tidal patterns of adjacent ocean basins or other regions of the same ocean basin. If the Earth were a perfect sphere without large continents, all areas on the planet would experience two equally proportioned high and low tides every lunar day. However, the large continents on the planet block the westward passage of the tidal bulges as the Earth rotates.

52. Arrange the following cities in descending order based on the length of the days during Summer in the Northern Hemisphere

1. Canberra
2. Oslo
3. San Francisco
4. Chennai
5. Kalimantan

Select the correct answer from the codes given below

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

Ans: d (2-3-4-5-1)

**Explanation:** The amount of insolation received throughout the earth is not equal. It is direct at the equator and inclined at the poles and also relative tilt of the earth axis to its elliptical plane at an angle of  $23\frac{1}{2}^\circ$  from a perpendicular to the orbital plane is responsible for the variation in the difference in the length of the days experienced throughout the Earth. Areas on the Equator have a constant 12 hours of daylight all year round. As latitude increases to  $80^\circ$  (polar circles - north or south), day length can increase to 24 hours or decrease to zero (depending on the time of year)

As it is mentioned as summer (Solstice) in the given statement, the length of the day will be lengthier at the poles and decrease as we move to the south.

- Oslo: Norway has highest day/night
- San Francisco: USA

- Chennai: India
- Kalimantan: Indonesia
- Canberra: Australia

53. Consider the following statements about Hot Springs

1. These springs are found in areas of present or past volcanic activity.
2. Hot springs which emit fountains of hot water and steam at almost regular intervals are called geysers.

Which of the statements given above are correct?

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

Ans: c (Both 1 and 2)

**Statement 1 is correct:** Hot springs and geysers also are manifestations of volcanic activity. They result from the interaction of groundwater with magma or with solidified but still-hot igneous rocks at shallow depths. Hot springs are generally found in regions of young volcanic activity when the surface water percolates downward through the rocks below the Earth's surface to high-temperature regions surrounding a magma reservoir, either active or recently solidified but still hot. There the water is heated, becomes less dense, and rises back to the surface along fissures and cracks in the form of a hot spring.

**Statement 2 is correct:** A geyser is a rare kind of hot spring under pressure and erupts, sending jets of water and steam into the air. Geysers are made from a tube-like hole in the Earth's surface that runs deep into the crust. A geyser is a vent on Earth's surface that periodically ejects a column of hot water and steam

54. Consider the following statements

Statement I: The dynamics of the Intertropical Convergence Zone have a significant role in changing the characteristics of the Indian monsoon rainfall

Statement II: The significant shifting of ITCZ towards the northern Hemisphere in summer causes South eastern trade winds to encroach into the



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Northern Hemisphere and blow as Southwest monsoon winds.

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

- (a) Both statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
- (b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
- (c) Statement-I is correct but Statement-II is incorrect
- (d) Statement-I is incorrect but Statement-II is correct

Ans: a (Both Statement 1 and Statement 2 are correct and Statement II is the correct explanation for Statement I)

**Explanation:** ITCZ is formed because of the convergence of the trade winds. The Northeast trade winds from Northern Hemisphere and southeast winds from the southern hemisphere converge here, forming Inter Tropical convergent zone (ITCZ). The ITCZ follows the sun in that the position varies seasonally. It moves north in the Northern Hemisphere summer and south in the Northern Hemisphere winter. Therefore, the ITCZ is responsible for the wet and dry seasons in the tropics. During summer in the northern hemisphere, the ITCZ shifts from approximately 40 degrees to 45 degrees North. Because of this shift, the south eastern trade winds in the southern hemisphere cross the equator and reach the northern hemisphere. Under the influence of Coriolis, the force acting upon it in the northern hemisphere gets deflected in the anticlockwise direction and strikes the Indian mainland as southwestern winds. This shift is responsible for the occurrence of monsoons in India

55. Consider the following statements

1. La Nina conditions in the Pacific Ocean can cause dry conditions in the horn of Africa.
2. “gu” and “deyr” refers to the two rainy seasons in the horn of Africa.
3. Both Eritrea and Somalia border the Gulf of Aden.

Which of the statements given above are correct?

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

Ans: a (1 and 2 only)

**Statement 1 is correct:** Climate change is pushing countries like Ethiopia, Kenya, and Somalia (Horn of Africa) into famine as they face their fifth consecutive deficit rainy seasons due to the exceptional weather situation of La Nina conditions. It is a large-scale natural cooling of ocean surface temperature in the central and eastern equatorial Pacific oceans. This is causing dry weather and high temperatures in East Africa. The impact of La Nina is increasing in eastern East Africa because of human-induced warming in the oceans. When there is a La Nina event, the west-to-east winds over the Pacific Ocean intensify, pushing the 'extra' heat in the Pacific into the western Pacific. These warm waters cause the rainfall around Indonesia to increase. To the west of this precipitation, one finds dry, hot, rising air over East Africa, which reduces total rainfall and increases air temperatures. The current multi-season drought has been produced by a natural multi-year La Nina event, amplified by climate change and expressed as exceptionally warm west Pacific sea surface temperatures and warm air temperatures over East Africa.

**Statement 2 is correct:** The Horn of African countries such as Djibouti, Ethiopia, Kenya, and Somalia receives rainfall regularly during the two rainy seasons such as gu, which occurs between April and June when around 50-60% of the rain falls. The second rainy season is called deyr (from August to November) and accounts for 20-30% of total rainfall. The 2020 and 2021 deyr seasons were significantly drier than average, as was the 2021 gu.

**Statement 3 is incorrect:** The Gulf of Aden is a deepwater gulf between Yemen to the north, the Arabian Sea to the east, Djibouti to the west, and Socotra and Somalia to the south. In the northwest, it connects with the Red Sea through the Bab El Mandeb strait and the Arabian Sea to the east. Whereas the country Eritrea borders the Red Sea and not the Gulf of Eden.



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56. Consider the following statements

Statement I: The deep-sea plains of the Indian Ocean is highly rugged.

Statement II: This is due to its formation from a large amount of solidified lava extending for hundreds of kilometres

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

- (a) Both statement-I and Statement-II are correct and Statement-II is the correct explanation for Statement-I
- (b) Both Statement-I and Statement-II are correct and Statement-II is not the correct explanation for Statement-I
- (c) Statement-I is correct but Statement-II is incorrect
- (d) Statement-I is incorrect but Statement-II is correct

Ans: a (Both Statement I and Statement II are correct and Statement II is the correct explanation for Statement I)

**Explanation:** Deep sea Plains are extensive, flat plains between the Continental Slope and Ocean abyss. It accounts for 82.7% of the total Oceanic area and covers the portion of the ocean falling between 2000-6000m in depth. The vast monotony of featureless deep sea plains is broken by the presence of features like ridges and guyots.

The ocean expedition discovered that the deep sea plains of the Atlantic and Pacific oceans are highly rugged. However, in the case of the Indian Ocean, the deep sea plains were found to be highly leveled, perhaps due to their formation from large hard lava extending over hundreds of kilometers.

57. Consider the following statements about Cyclones

- 1. The cyclone's approach is characterized by a rise in barometric reading, clear sky, strong oppressive winds and bad weather
- 2. The approach of Anticyclone is characterized by the dull sky, calm air and low temperature in summer.
- 3. Wind speed during the depression is between the 49-61 km/h
- 4. Cyclones formed in Pacific ocean are known as Willy Willy

How many statements given above are incorrect?

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

Ans: d (All four)

**Statement 1 is incorrect:** The Cyclones are better known as depressions. The lowest pressure is in the center, and the isobars are close. Depressions vary from 150 to 2,000 miles in extent. They remain quite stationary or move several hundred miles in a day. The approach of a cyclone is characterized by a fall in barometric reading, dull sky, oppressive air, and strong winds. The Instrument used to measure atmospheric pressure is Called a Barometer, whereas Bathometer is an instrument for measuring water depth. Cyclones are caused due to pressure difference which is measured using a barometer, not a bathometer

**Statement 2 is incorrect:** Anticyclones are the opposite of cyclones, with high pressure in the center and the isobars far apart. The pressure gradient is gentle, and the winds are light. Anticyclones normally herald fine weather. The skies are clear, the air is calm, and temperatures are high in summer but cold in winter.

**Statement 3 is incorrect:** The wind speed during the depression is between 31-49km/h

**Statement 4 is incorrect:** Cyclones in the Indian Ocean and South Pacific Ocean. Hurricanes in the Atlantic Ocean and the eastern North Pacific Ocean. Typhoons in the Western Pacific Ocean and the South China Sea. Willy-willies in the Western Australia Ocean.

58. Consider the following statements

- 1. Vertical Temperature gradient refers to the fall in temperature with respect to altitude.
- 2. The Gradient value decreases by 6.5°C per kilometre of ascend
- 3. Nature of Soil can have an impact on temperature gradient

Which of the statements given above are correct?

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



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(d) 1, 2 and 3

Ans: d (1, 2 and 3)

**Statement 1 is correct:** The average rate of temperature decreases upward in the troposphere is about 6 degree Celsius per kilometer, extending to the tropopause. This vertical temperature gradient is commonly referred to as the standard atmosphere or normal lapse rate, but it varies in height, season, latitude and other factors.

**Statement 2 is correct:** The average rate of decrease in temperature of the air as it moves upward in the troposphere is about 6 degree Celsius per km, extending to the tropopause. The normal lapse rate is 6 degrees Celsius per 1000m meters.

**Statement 3 is correct:** Soil devoid of vegetation cover receives heat more rapidly than the soil under vegetation cover. Because vegetation cover absorbs much of sun's heat and then prevents quick radiation from the earth whereas the former radiates it more rapidly.

59. Consider the following statements about fluvial erosional and depositional landforms

1. Swamps and Marshes
2. V-shaped valleys
3. Waterfalls and Rapids
4. Braided Channels

How many of the above are not formed during the old age course of a river?

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

Ans: b (Only two)

**Statement 1 is incorrect:** A marsh is a type of wetland, an area of land where water covers the ground for long periods. Unlike swamps, which are dominated by trees, marshes are usually treeless and dominated by grasses and other herbaceous plants. Marshes and swamps are developed during the youth stage and mature during the old river stage.

**Statement 2 is correct:** V Shaped valleys are formed during the Youth stage of the river. During the youth stage, the river's velocity is fast and strong, and it flows down a steep gradient, making it deeper than

wider. Thus Vshaped valleys are not formed during the old age course of a river.

**Statement 3 is incorrect:** Rapids are formed when a fast-flowing river quickly cuts downward through a bed of hard and soft rocks, eroding the soft rock and leaving the hard rocks standing above the water's surface. These are formed during the youth stage of the river and not during the old stage

**Statement 4 is correct:** A braided channel is a network of channels formed in a river with a great amount of sediment and a fluctuating discharge pattern. These are formed during the old stage of the river

60. Consider the following statements with reference to the Deccan Trap

1. It is the result of Volcanic eruption
2. It is largely made of granitic rocks believed to be contributed by the Reunion Hotspot volcano
3. The lava plateau has a minimum thickness along the coast of Mumbai, from where it increases towards the south and east of the Deccan trap

How many statements given above are correct?

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

Ans: a (Only one)

**Statement 1 is correct:** At the close of the Cretaceous period (144- 65 Million years), peninsular India witnessed a major phase of volcanic activity. It was a remarkable event in the geology of India, where numerous lava flows were poured out mainly through fissure-type of volcanic eruption and covered a vast area of the Deccan Plateau in western and central India. These lava flows formed one of the Largest Igneous Provinces in the world, known as the Deccan Traps or Deccan Volcanic Province. It consists of a composite thickness of more than 6,500 feet (>2,000 m) of flat-lying basalt lava flows and covers an area of nearly 200,000 square miles (500,000 square km) in west-central India. The Deccan lava covers about 5 lakh sq km of area in Gujarat (Katch, Kathiawad), Maharashtra, Madhya Pradesh (Malwa Plateau),



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Chhattisgarh, northern Andhra Pradesh, and north-western Karnataka.

**Statement 2 is incorrect:** When the molten magma comes out from the volcano, it cools and becomes solid. These rocks are called igneous rocks (also called primary rocks). They are two types:

- Intrusive rocks (molten magma cools down slowly, deep inside the earth's crust forming intrusive rocks such as Granitic rocks, which are hard and forms large grain structure)
- Extrusive rocks (molten lava comes onto the earth's surface, it rapidly cools down and becomes solid forming extrusive rocks such as Basaltic rocks, which are very fine-grain structured)

Deccan Trap volcanism is associated with a deep mantle plume or hot spot. The plume or hot spot caused the continent to break apart. This Hotspot is known as the Reunion hotspot. The reunion Hotspot is suspected of both causing the Deccan Traps eruption and opening the rift that separated the Mascarene Plateau from India. Thus the Deccan trap is largely made of Basaltic rocks and not Granitic rocks.

**Statement 3 is incorrect:** The Indian lava plateau (Deccan Trap) has a maximum thickness of around 3000 m along the coast of Mumbai, after which it thins down towards the south and east. It is around 800 m in Kachchh, 150 m in Amarkantak, and 60 m in Belgaum (Karnataka). Individual lava flows range in thickness from 5 m to 29 m on average. Such discharges were discovered in digging near Bhusawal (Maharashtra).

61. Consider the following statements about Andaman and Nicobar Islands

1. It consists of more than 500 islands.
2. They are separated by the Nine-Degree Channel
3. They are endowed with tropical rainforests.
4. Paddy is the main food crop, mostly cultivated in the Andaman group of Islands.

How many statements given above are correct?

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

(d) All four

Ans: c (Only three)

**Statement 1 is correct:** Andaman & Nicobar Islands comprise 572 Islands (including islets & rocks) and has a geographical area of 8,249 sq km, constituting 0.25% of the country's total geographical area

**Statement 2 is incorrect:** The Andaman islands and Nicobar islands are the two groups separated by the 10° N Channel, whereby the Andaman lies to the north of this latitude and the Nicobar to the south.

**Statement 3 is correct:** Andaman & Nicobar Islands support very luxuriant and rich vegetation due to tropical hot and humid climate with abundant rains. As per the Champion & Seth Classification of Forest Types (1968), the forests in Andaman & Nicobar Islands belong to four Type Groups i.e

- Tropical Wet Evergreen
- Tropical Semi Evergreen
- Tropical Moist Deciduous
- Littoral & Swamp forests

The Middle & North Andaman are characterised by Moist Deciduous & Wet Evergreen forests, respectively. The Evergreen forests dominate the Central & Southern Islands of the Nicobar group. The moist deciduous forests are common in the Andamans; they are almost absent in the Nicobar islands. Overall the entire island group possesses tropical evergreen rainforest

**Statement 4 is correct:** The cultivated area is only 5% of the total geographical area. Paddy is the main food crop mostly cultivated in the Andaman group of islands. In contrast, coconut and Arecanut are the cash crops of the Nicobar group of islands. Other than that, Field crops, namely pulses, oilseeds and vegetables, are grown, followed by paddy during the Rabi season.

62. Consider the following statements about Indus River system

1. The principal tributaries of the Indus, namely the Jhelum, Chenab, Ravi, Beas and Sutlej forms the left bank tributary to the river
2. India has restricted use over the waters of the Indus, Jhelum and Chenab waters.



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3. It is bounded on the west by the Karakoram and Haramosh ranges and on the east by the Sulaiman and Kirthar ranges
4. Kishan Ganga power project is located on the tributary of Jhelum river

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** Indus basin is of extraordinary variation in altitude, climate, land use, cropping pattern, and in the availability of water resources. Indus has been the cradle of human civilization since time immemorial. The length of the Indus River in India is 1114 km. The total catchment area of the basin is 321289 Sq. Km.

The Indus basin extends over China (Tibet), India, Afghanistan, and Pakistan draining an area of 11, 65,500 Sq.km. The principal tributaries lying on the left of the Indus area are the Jhelum, Chenab, Ravi, Beas, Sutlej, Zaskar, Suru, Dras, Krishnganga. Jhelum, Beas, Ravi, Sutlej are joined to the Chenab which is then joined left to the Indus.

Right bank tributaries of Indus are Shyok, Nubra, Gilgit

**Statement 2 is correct:** In the year 1960, India and Pakistan signed a water distribution agreement known as Indus Water Treaty with the mediation of World Bank. Under the treaty, all the waters of the three eastern rivers such as Ravi, Beas, and Sutlej were allocated to India for exclusive use. But the waters of the western rivers - Indus, Jhelum, and Chenab, were allocated to Pakistan except for 'specified domestic, non-consumptive and agricultural use permitted to India,' according to the treaty. Thus, India has also been given the right to generate hydroelectricity through the run-of-the-river (RoR) projects on the western rivers which, are subject to specific criteria for design and operation due to their restricted use.

**Statement 3 is incorrect:** The basin is bounded by the Himalayas on the east, by the Karakoram and Haramosh ranges on the north, by the Sulaiman and Kirthar ranges on the west, and by the Arabian Sea on

the south. The Indus River rises from the lofty mountains of the Himalayas around Mansarovar Lake in Tibet at an elevation of 5,182 m

**Statement 4 is correct:** Kishanganga Power station is located on Kishanganga River, a tributary of river Jhelum in Bandipora District of Union Territory of Jammu & Kashmir.

63. Consider the following statements about Cotton production in India

1. In India, the cotton crop is grown only in the Western and Southern States of India.
2. Cotton seed oil is edible oil and can also be used to produce biodiesel
3. Similar to other Agro-processing industries, the cotton textile industry is also a weightloss industry.
4. Pink Bollworm syndrome is associated with Cotton cultivation

How many statements given above are correct?

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

Ans: b (Only two)

**Statement 1 is incorrect:** In India, the cotton crop is grown mainly in the central and southern States of India. The central zone includes Madhya Pradesh, Maharashtra and Gujarat, and the south zone comprises Andhra Pradesh, Telangana, Karnataka and Tamil Nadu. Therefore, the cotton crop grown in India is not only in Western and Southern parts of Indian states but also in Northern parts of India.

**Statement 2 is correct:** Cotton seed oil can be used to make salad oil (mayonnaise, salad dressings, sauces and marinades), cooking oil for frying in both commercial and home cooking, and margarine or shortening for baked goods and cake icings. Biodiesel is a renewable, biodegradable fuel manufactured domestically from vegetable oils and animal fats, and it was produced from crude cottonseed oil (triglycerides) by transesterification. Some of the main resources for biodiesel production from non-edible oils are Jatropha, cotton seed oil, rice bran oil, mahua seed oil etc.





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**Statement 3 is incorrect:** Cotton is a pure raw material which does not lose weight in the manufacturing process. The cotton textile industry uses a non-weight-losing raw material and is generally located in large urban centres. Therefore, the Cotton textile industry is a Weight-gaining industry

**Statement 4 is correct:** Pink Bollworm is considered possibly the most destructive pest on cotton worldwide. It is native to India but is now found in nearly all the cotton-growing countries of the globe. The damage affects both the weight and quality of the harvested bolls containing the lint fibre and seeds inside, thus, reducing both the yield and quality.

64. Consider the following statements about Aluminium Industry in India

1. The ores for Aluminium are usually found at great depths below the surface and are seldom found at the top of plateaus and mountains
2. Aluminium Smelting is more energy intensive than Copper smelting.
3. Odisha is the largest producer of Bauxite in India

Which of the statements given above are correct?

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

Ans: c (2 and 3 only)

**Statement 1 is incorrect:** There are several ores that contain aluminium. But it is from bauxite, a clay-like substance that alumina and later aluminium is obtained. Bauxite deposits are formed by the decomposition of a wide variety of rocks rich in aluminium silicates. It is not a specific mineral but a rock that consists mainly of hydrated aluminium oxides. It is mostly associated with laterite soil whose deposits occur as blankets or cuppings on hills and are always mostly at the top of plateaus.

**Statement 2 is correct:** Aluminium smelting is the process of extracting Aluminium from its oxide, alumina and is an electrolytic process, so an aluminium smelter uses huge amounts of electric power. Copper smelting is the process through which the copper ore is purified through intense heating and

melting to derive high-quality Copper or copper products. Aluminium production is more energy intensive and depends on electricity which requires around 14 MWh per tonne of metal, which is about seven times more than copper smelting. Copper is not the most energy-intensive metal to produce.

**Statement 3 is correct:** Odisha is India's largest bauxite producer accounting for about 49% of the total production followed by Gujarat (24%), Jharkhand (9%), Chhattisgarh and Maharashtra (8% each). The remaining was produced by Madhya Pradesh, Goa, Karnataka and Tamil Nadu.

65. A settlement in a high rainfall region photographed by a satellite shows that the houses are arranged along the perimeter of an oval. Which of the following feature may have determined such a rural settlement pattern?

1. Crater of an extinct volcano
2. Lake
3. A junction of road
4. Agriculture plot

How many statements given above are correct?

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

Ans: b (Only two)

**Explanation:** Rural settlements are those where people mostly engage in agriculture and allied activities (livestock keeping, dairy farming, poultry, forestry, fisheries, and mining). The rural settlements may be broadly divided into two categories

- The compact or nucleated settlements
- The dispersed or scattered settlements

The compact settlements have a well-developed network of roads, streets, lanes, and galis not only in the settlement but also in the fields and surrounding areas. In the dispersed or scattered settlement, only one family residence is the core which stands isolated from the other houses.

Circular and semi-circular in rural settlements generally develop around a pond, a lake, a crater or a sea coast. Since people prefer to stay closer to the water body, they construct their houses close to the pond or lake.



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66. M23, CODECO and ADF rebel groups recently seen in news is associated with which country?

- (a) Democratic Republic of Congo
- (b) Yemen
- (c) Somalia
- (d) Mali

Ans: a (Democratic Republic of Congo)

#### Explanation:

M23: Operating in North Kivu province, the group takes its name from the March 23 Agreement of 2009 when the DRC government, under President Joseph Kabila — son of Laurent-Désiré Kabila — signed a ceasefire treaty with the Tutsi-majority National Congress for the Defence of the People (CNDP), one of the numerous groups of fighters active since the Second Congo War. In the agreement, the CNDP was meant to become a political party and its fighters were to integrate into the Congolese military, FARDC.

Allied Democratic Forces (ADF): Originally from Uganda, the Allied Democratic Forces (ADF) also operates in the eastern DRC, in the regions bordering Uganda. The group initially claimed to be fighting for an Islamic state in Uganda where Muslims make up a minority of between 15 and 35 percent. It's not clear what boundaries the reclusive ADF wants to claim, but the group first settled in Buseruka, western Uganda, before it was pushed back into the DRC. But it has recruited along secular lines over the years. Formed in 1996, during the First Congo War, it used a weak DRC as its base to launch attacks into Uganda. Ugandan troops used their presence in the DRC during the two wars to attack ADF fighters. The group went dormant in 2001 and resurfaced in 2013. It's now reportedly linked to the ISIL (ISIS) armed group.

The Cooperative for Development of the Congo (CODECO): It was formed in 1999 during the Second Congo War, and operates in eastern Ituri. It was initially an agricultural cooperative but started to advocate for the Lendu ethnic group, who believed they were unfairly dominated by the rival Hema ethnic group. After a period of dormancy, CODECO launched offensives in 2017 and has continued to attack local civilians and Congolese forces. In February 2024, CODECO ambushed civilians, killing 15 people believed to be Hema in a likely

continuation of the rivalry. The group has also targeted gold mines in recent weeks.

67. Consider the following statements about the Diabetes disease in India

1. It develops when liver doesn't make enough insulin or any at all in human body
2. Type 1 diabetes is more prevalent among children
3. Blurred vision is one of the symptoms of Diabetes
4. Type 1 diabetes is also known as Insulin-dependent diabetes

How many of the above statements are correct?

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

Ans: c (Only three)

**Statement 1 is incorrect:** Diabetes mellitus refers to a group of diseases that affect how the body uses blood sugar (glucose). Glucose is an important source of energy for the cells that make up the muscles and tissues. It is a condition that happens when the blood sugar (glucose) is too high. It develops when your pancreas doesn't make enough insulin or any at all, or when the body isn't responding to the effects of insulin properly.

**Statement 2 is correct:** India is among the high-occurrence countries of people living with Type 1 diabetes that is predicted to see an increase in numbers by 2040. As of today, there are approximately 8.6 lakh people with Type 1 diabetes in India with one in six young people dying without a diagnosis.

**Statement 3 is correct:** Symptoms includes

- Feeling very thirsty
- Needing to urinate more often than usual
- Blurred vision
- Feeling tired
- Losing weight unintentionally

**Statement 4 is correct:** Type 1 diabetes is also known as Insulin dependent Diabetes because patients with Type 1 diabetes will die even if he/she didn't take the insulin for a single day



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68. Consider the following statements about the Protection of Children from Sexual Offences Act: 2012 (POCSO Act)

1. Any person who is below the age of 18 is defined as Child under this act
2. Victims must report the sexual abuse within one year of incident
3. All forms of media are prohibited from disclose the name of victim
4. The maximum punishment under this act was death sentence

How many of the above statements are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** Section 2 of POCSO Act defines any person below the age of 18 years as child

**Statement 2 in incorrect:** Section 19 of the POCSO Act, which deals with sexual crimes against children, lays down the procedure for reporting a crime but doesn't specify a time limit or statute of limitation for reporting it.

**Statement 3 is correct:** Section 23 provides that "No reports in any media shall disclose, the identity of a child including his name, address, photograph, family details, school, neighbourhood or any other particulars which may lead to disclosure of identity of the child".

**Statement 4 is correct:** Section 6: Punishment for aggravated penetrative sexual assault.—(1) Whoever commits aggravated penetrative sexual assault shall be punished with rigorous imprisonment for a term which shall not be less than twenty years, but which may extend to imprisonment for life, which shall mean imprisonment for the remainder of natural life of that person and shall also be liable to fine, or with death.

69. Who among the following releases "Global Terrorism Index"?

- (a) Institute for Economic and Peace
- (b) Cushman and Wakefield group
- (c) World Economic Forum
- (d) United Nations Security Council

Ans: a (Institute for Economics and Peace)

**Explanation:** It is published annually by Institute for Economics and Peace (IEP). The Institute for Economics and Peace (IEP), a global think tank with headquarter at Sydney, Australia.

The index is based primarily on the Global Terrorism Database (GTD) collated by the National Consortium for the Study of Terrorism and Responses to Terrorism (START) at the University of Maryland, besides other sources.

The index provides a comprehensive summary of the key global trends and patterns in terrorism since 2000. GTI scores are directly used in the Global Peace Index, the Global Slavery Report.

India ranks at 13<sup>th</sup> position with the score of 7.43 and crime index score of 44.7 indicated a decline in terror and crime incidents since 2016 which can be attributed to strengthened security measures.

70. Consider the following statements about the UN Convention on Transnational Organised Crime (UNTOC)

1. The convention was signed in 2000 at Palermo, hence it is also known as Palermo Convention
2. It is first international convention to deals with human trafficking, arms trafficking, money laundering and terrorism
3. United Nations office on Drugs and Crime(UNODC) acts custodian for UNTOC
4. It is universally ratified all UN member countries

Which of the following options are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** The United Nations Convention Against Transnational Organized Crime (UNTOC, also called the Palermo Convention) is a 2000 United Nations-sponsored multilateral treaty against transnational organized crime.

**Statement 2 is correct:** This convention was the first international convention to fight transnational



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organized crime, trafficking of human beings, money laundering and terrorism.

**Statement 3 is correct:** UNTOC's three supplementary protocols (the Palermo Protocols) are:

- Protocol to Prevent, Suppress and Punish Trafficking in Persons, Especially Women and Children.
- Protocol Against the Smuggling of Migrants by Land, Sea and Air.
- Protocol Against the Illicit Manufacturing of and Trafficking in Firearms.

All four of these instruments contain elements of the current international law on human trafficking, arms trafficking and money laundering. The United Nations Office on Drugs and Crime (UNODC) acts as custodian of the UNTOC and its protocols.

**Statement 4 is incorrect:** As of 27 February 2023, it has 191 parties, which includes 186 United Nations member states, the Cook Islands, the Holy See, Niue, the State of Palestine, and the European Union. The seven UN member states that are not party to the convention are (\* indicates that the state has signed but not ratified the convention):

- Republic of Congo
- Iran
- Papua New Guinea
- Solomon Island
- Somalia
- South Sudan
- Tuvalu

71. Consider the following statements about the Pygmy Hogs

1. They are endemic to West Bengal and Assam
2. Manas National Park was identified for the Pygmy Hog Conservation Programme (PHCP)
3. The IUCN Status of Pygmy Hog was Critically Endangered
4. It is an indicator species which reflects the health of grasslands of the region

How many of the above statements are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** The species was historically known from only a few locations in northern West Bengal and north-western Assam in India.

**Statement 2 is correct:** Eighteen captive-bred pygmy hogs, the smallest and rarest pigs on earth, were released in western Assam's Manas National Park and Tiger Reserve on Saturday, September 30. It was the fourth such exercise undertaken under the Pygmy Hog Conservation Programme (PHCP) annually since 2020, helping up the total number of this endangered species released at the park to 54. The PHCP target is to reintroduce 60 pygmy hogs in Manas, its historical habitat, by 2025.

**Statement 3 is incorrect:** The IUCN Status of Pygmy hog is Endangered

**Statement 4 is correct:** It is also an indicator species. Its presence reflects the health of its primary habitat, the tall, wet grasslands of the region.

72. Consider the following statements about Intelligent Grievance Monitoring System (IGMS) 2.0

1. It is being developed by Indian Institute of Technology, Bombay
2. It provides the tabular analysis of grievances filled in Centralised Public Grievance Redress and Monitoring System (CPRGAMS)
3. CPRGAMA was maintained by the Ministry of Electronics and Information Technology
4. It will not entertain any cases/grievances related to Right to Information Act

How many of the above statements are correct?

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

Ans: b (Only two)

**Statement 1 is incorrect:** Intelligent Grievance Monitoring System (IGMS) is developed by IIT Kanpur

**Statement 2 is correct:** Provide instant tabular analysis of Grievances Filed in Centralised Public Grievance Redress and Monitoring System (CPRGAMS) and disposed of. Offer State-wise and district-wise Grievances Filed data. Offer Ministry-



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wise data. Enhance grievance redressed process with AI capabilities.

**Statement 3 is incorrect:** It will be maintained by Ministry of Personal, Public Grievance and Pensions

**Statement 4 is correct:** Issues which are not taken up for redress

- RTI Matters
- Court related / Subjudice matters
- Religious matters
- Suggestions
- Grievances of Government employees concerning their service matters including disciplinary proceedings etc. unless the aggrieved employee has already exhausted the prescribed channels

73. 'Badis Limaakumi' recently seen in news is a?

- (a) Bird Species
- (b) Fish Species
- (c) Medicinal Herb
- (d) Butterfly Species

Ans: b (Fish Species)

**Explanation:** About Badis limaakumi:

- Family: Badidae.
- Genus: Badis.
- Location: Nagaland, Northeast India.
- It was found in Nagaland's Malak River.
- Habitat: It is found in various freshwater habitats, including rivers, ponds, and marshes.
- Distribution: These fish are primarily found in freshwater bodies across northern India, Pakistan, Bangladesh, Bhutan, and Nepal.
- Around 25 recognized species, 15 of which are in India.
- Naming: it has been named after Limaakum, assistant professor and head of the zoology department at Fazl Ali College, Nagaland.
- Unique feature: **This fish can change its colour like a chameleon.**

74. Consider the following statements about sources of Lead

1. Mining
2. Electroplating
3. Waste incineration

4. Drinking Water

How many statements given above are correct?

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

Ans: d (All four)

**Explanation:** Anthropogenic sources of Lead (Pb) include the mining and smelting of ore, manufacture and use of Pb-containing products, combustion of coal and oil, and waste incineration. Other major sources of Lead includes:

- Paints
- Dust
- Soil
- Drinking water
- Air
- Folk Medicine, Ayurvedic and Cosmetics
- Children Jewellery and Toys
- Imported food in cans
- Firearms with lead bullets
- Car batteries
- Consumer products

Electroplating is major source of Chromium. Electroplating is the process of coating a metal with a thin layer of another metal by electrolysis to improve the metal's corrosion resistance.

**Health Impacts associated with Exposure of Lead:** Anaemia, hypertension, renal impairment, immunotoxicity, toxicity of reproductive organs and these impacts are irreversible.

75. Consider the following statements about the Convention on International Transport of Goods Under Cover of TIR Carnets (TIR Convention)

1. This convention was adopted under the auspices of United Nations Economic Commission for Europe (UNECE)
2. It eliminates the extensive and time-consuming border checks at international borders
3. It covers all modes of transport systems
4. India was elected to the executive board in 2023

How many statements given above are correct?

- (a) Only one



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

Ans: c (Only three)

**Statement 1 is correct:** The Convention on International Transport of Goods Under Cover of TIR Carnets (TIR Convention) is a multilateral treaty that was concluded at Geneva on 14 November 1975 to simplify and harmonise the administrative formalities of international road transport. TIR stands for "Transports Internationaux Routiers" or "International Road Transports". The conventions were adopted under the auspices of the United Nations Economic Commission for Europe (UNECE).

**Statement 2 is correct:** The TIR Convention establishes an international customs transit system with maximum facility to move goods:

- In sealed vehicles or containers
- From a customs office of departure in one country to a customs office of destination in another country
- Without requiring extensive and time-consuming border checks at intermediate borders
- While, at the same time, providing customs authorities with the required security and guarantees.

**Statement 3 is correct:** The TIR system not only covers customs transit by road but a combination is possible with other modes of transport (e.g., rail, inland waterway, and even maritime transport), as long as at least one part of the total transport is made by road

**Statement 4 is incorrect:** India became a part of this convention in 2017. However it never be a part of Executive board of the convention. Recently it organised a meeting of the contracting parties to gather their support for its membership to TIR conventions executive council.

76. Consider the following statements about Cordy Gold Nano-Particles (Cor-AuNPs)

1. These nano particles derived from Cordyceps militaris and Gold salts
2. Smallest quantum dots shine in blue colour

3. These particles can be delivered as ointment, tablets and capsules

Which of the statements given above are correct?

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

Ans: d (1, 2 and 3)

**Statement 1 is correct:** These nanoparticles, derived from the synthesis of the extracts of Cordyceps militaris and gold salts, could make drug delivery in the human body faster and safer. Cordyceps militaris is a high value parasitic fungus. Gold salts are ionic chemical compounds of gold generally used in medicine. Wild Cordyceps mushrooms are found in the eastern Himalayan belt.

**Statement 2 is correct:** The smaller the tiny crystals get, the more electrons are 'squeezed,' the bigger the bandgap. So, the smallest dots emit blue light, bigger ones shine red. Many colors in between are accessible as well, simply by changing the size of the quantum dots.

**Statement 3 is correct:** Biosynthesised nano gold particles indicate a new application of nanoparticles in the development of therapeutic drugs which can be delivered as ointments, tablets, capsules, and in other forms.

77. Consider the following pairs

Lake	Location
Lhonak Lake	Sikkim
Suraj Tal Lake	Himachal Pradesh
Sela Lake	Arunachal Pradesh
Pangong Tso	Ladakh

How many pairs are correctly matched?

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

Ans: d (All four)

**Pair 1 is correctly matched:** South Lhonak Lake is a glacial-moraine-dammed lake, located in Sikkim's far northwestern region. It is one of the fastest expanding lakes in the Sikkim Himalaya region, and one of the 14 potentially dangerous lakes susceptible to Glacial lake outburst flood (GLOFs).



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**Pair 2 is correctly matched:** Suraj Tal which translates to Sun God's Lake is an 8 km (5.0 mi) long lake that lies just below the 16,040 ft high Bara-lachalla pass in Lahaul and Spiti valley of the Indian state of Himachal Pradesh and is the third highest lake in India. Being located in Himachal Pradesh this lake is surrounded by scenic beauty. Suraj Tal has religious importance for locals of the area and is best seen at dawn as the sun is reflected beautifully on the surface of the lake. Lahaul Spiti Valley is a common destination for Indian and foreign tourists for road trips, trekking, and motorcycling which covers the Lake and the Bara-lachalla pass, en-route from Manali to Leh.

**Pair 3 is correctly matched:** The Sela Pass, more appropriately called Se La, is a high-altitude mountain pass located on the border between the Tawang and West Kameng Districts of Arunachal Pradesh state in India. There are close to 101 lakes in Sela One of these 101 lakes is the decently large Sela Lake which is located right on the top of Sela Pa. This lake is so stunning that it's also called Paradise Lake.

**Pair 4 is correctly matched:** Pangong Tso is the most popular tourist attraction in Ladakh located at a height of 14000 feet. A fascinating feature about this lake is that its color is constantly changing. It changes colors from azure to light blue to green and grey too.

78. Consider the following statements about interventions being implemented under Anaemia Mukta Bharat Strategy

1. It provides prophylactic calcium supplementation for preschool children, adolescents and pregnant women
2. It runs a campaign for delayed cord clamping at the time of childbirth
3. It provides for periodic deworming to children and adolescents
4. It addresses non-nutritional causes of anaemia in endemic pockets with a special focus on malaria, hemoglobinopathies and fluorosis

How many statements given above are correct?

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

(d) All four

Ans: d (All four)

**Explanation:** The Anemia Mukta Bharat strategy is a universal strategy and will focus on the following interventions:

- ❖ Prophylactic Iron and Folic Acid supplementation
- ❖ Deworming
- ❖ Intensified year-round Behaviour Change Communication Campaign (Solid Body, Smart Mind) focusing on four key behaviours
- ❖ Improving compliance to Iron Folic Acid supplementation and deworming
- ❖ Appropriate infant and young child feeding practices,
- ❖ Increase in intake of iron-rich food through diet diversity/quantity/frequency and/or fortified foods with focus on harnessing locally available resources and
- ❖ Ensuring delayed cord clamping after delivery (by 3 minutes) in health facilities
- ❖ Testing and treatment of anemia, using digital methods and point of care treatment, with special focus on pregnant women and school-going adolescents
- ❖ Mandatory provision of Iron and Folic Acid fortified foods in government-funded public health programmes
- ❖ Intensifying awareness, screening and treatment of non-nutritional causes of anemia in endemic pockets, with special focus on malaria, haemoglobinopathies

Note: Delaying cord clamping allows blood flow between the placenta and neonate to continue, which may improve iron status in the infant for up to six months after birth. This may be particularly relevant for infants living in low-resource settings with reduced access to iron-rich foods.

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79. Consider the following countries

- USA
- Mexico
- Panama
- Brazil

How many of the above countries are members of Americas Partnership for Economic Prosperity (APEP)?

- Only one
- Only two
- Only three
- All four

Ans: c (Only three)

**Explanation:** It is one of the key initiative led by USA for economic development of the entire south and North Americas. The Americas Partnership charts a path forward to tackle economic inequality, foster regional economic integration and good jobs, and restore faith in democracy by delivering for working people across the region.

The Member countries are: Barbados, Canada, Chile, Colombia, Costa Rica, Dominican Republic, Ecuador, Mexico, Panama, Peru, Uruguay, and the United States

**North America:** USA, Canada and Mexico

**Central America:** Panama, Dominican Republic, Costa Rica and Barbados

**South America:** Colombia, Ecuador, Peru, Chile, Uruguay

80. Consider the following statements about the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA)

- It was created as a result of 6 days war between Israel and Arabs in 1967
- Its mandate includes education, health care, employment and direct relief
- It operates in Jordan, Lebanon, Syria, Turkey and Egypt

Which of the statements give above is/are incorrect?

- 1 and 2 only
- 1 and 3 only
- 2 and 3 only
- 1, 2 and 3

Ans: b (1 and 3 only)

**Statement 1 is incorrect:** UNRWA was established in 1949 by the UN General Assembly (UNGA) to provide relief to all refugees resulting from the 1948 conflict. It also provided relief to Jewish and Arab Palestine refugees inside the State of Israel following the 1948 conflict until the Israeli government took over responsibility for them in 1952

**Statement 2 is correct:** Originally, It is intended to provide employment and direct relief, its mandate has broadened to include providing education, health care, and social services to its target population.

**Statement 3 is incorrect:** UNRWA operates in five areas: Jordan, Lebanon, Syria, the Gaza Strip and the West Bank, including East Jerusalem; aid for Palestinian refugees outside these five areas is provided by United Nations High Commissioner for Refugees (UNHCR).

81. 'LockBit' recently seen in news is a?

- Ransomware attack
- Man-in-the-middle attack
- Crypto currency developed by Meta
- AI tool developed by Google

Ans: a (Ransomware attack)

**Explanation:** LockBit is a new ransomware attack in a long line of extortion cyberattacks. Formerly known as "ABCD" ransomware, it has since grown into a unique threat within the scope of these extortion tools.





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LockBit is a subclass of ransomware known as a 'crypto virus' due to forming its ransom requests around financial payment in exchange for decryption. It focuses mostly on enterprises and government organizations rather than individuals.

Most significant is its ability to self-propagate, meaning it spreads on its own. In its programming, LockBit is directed by pre-designed automated processes. This makes it unique from many other ransomware attacks that are driven by manually living in the network — sometimes for weeks — to complete recon and surveillance.

82. Consider the following bodies report through Special Political and Decolonization Committee of the United Nations (SPECPOL)

1. Committee on Information
2. Committee on Refugees
3. Committee on Peacekeeping operations
4. Committee to investigate Israeli Practices effecting the Human Rights of the Palestine peoples and other Arabs of the Occupied Territories

How many of the above are part of SPECPOL?

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

Ans: c (Only three)

**Explanation:** The United Nations General Assembly Fourth Committee (also known as the Special Political and Decolonization Committee or SPECPOL or C4) is one of six main committees of the United Nations General Assembly. It deals with a diverse set of political issues, including UN peacekeeping and peaceful uses of outer space. However, the issues of decolonization and the Middle East take up most of its time.

The following bodies report through the Fourth Committee to the General Assembly:

- ❖ Committee on Information
- ❖ Committee on the Peaceful Uses of Outer Space (COPUOS)
- ❖ Special Committee on Peacekeeping Operations (C-34)
- ❖ Special Committee on Decolonization (C-24)

- ❖ Special Committee to Investigate Israeli Practices Affecting the Human Rights of the Palestinian People and other Arabs of the Occupied Territories
- ❖ United Nations Relief and Works Agency for State of Palestine Refugees in the Near East (UNRWA)
- ❖ United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR)

83. 'Euclid' space mission recently seen in news is launched by?

1. NASA
2. ISRO
3. European Space Agency
4. JAXA

Ans: c (European Space Agency)

**Explanation:** Euclid is a wide-angle space telescope with a 600-megapixel camera to record visible light, a near-infrared spectrometer, and photometer, to determine the redshift of detected galaxies. It was developed by the European Space Agency (ESA) and the Euclid Consortium and was launched on 1 July 2023.

After approximately one month, it reached its destination, a halo orbit around the Sun-Earth second Lagrange point L2, at an average distance of 1.5 million kilometres beyond Earth's orbit (or about four times the distance from the Earth to the Moon). There the telescope is expected to remain operational for at least six years.

The objective of the Euclid mission is to better understand dark energy and dark matter by accurately measuring the accelerating expansion of the universe.

**Note:** Dark matter pulls galaxies together, while dark energy pushes them apart. Dark energy is responsible for expansion of universe.

84. 'MARUMEX' Maritime Security Exercise recently held between which countries?

- (a) India-Myanmar
- (b) India-France
- (c) Russia-Pakistan
- (d) Russia-Myanmar

Ans: d (Russia-Myanmar)



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**Explanation:** Russia and Myanmar held new maritime drills this week. Myanmar state media noted that the 1st Myanmar-Russia Security Exercise (MARUMEX) and related activities, launched at the Thilawa Port of Yangon on November 5, lasted until their full conclusion on November 9. This occurred amid a series of ongoing challenges for the ruling junta, including a major offensive against it by allied ethnic armed groups in the north.

85. Consider the following statements

1. Michael Faraday has popularised the 'Anode', 'Cathode' and 'Electrode' terminology
2. Electric battery uses redox reactions to produce electric current
3. Anode is positively charged electrode on to which electrons arrive
4. Terminal voltage is the driving force that pushes the electrons from Anode to Cathode

How many statements given above are correct?

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

Ans: c (Only three)

**Statement 1 is correct:** Faraday discovered benzene, investigated the clathrate hydrate of chlorine, invented an early form of the Bunsen burner and the system of oxidation numbers, and popularised terminology such as "anode", "cathode", "electrode" and "ion". Faraday ultimately became the first and foremost Fullerian Professor of Chemistry at the Royal Institution, a lifetime position

**Statement 2 is correct:** A voltaic, or galvanic, cell uses redox reactions to produce an electric current. The cell consists of two half-cells. Each half-cell is made of a metal electrode immersed in an electrolyte of that metal – say, a zinc electrode in zinc sulphate and a copper electrode in copper sulphate.

Note: A Voltaic Cell (also known as a Galvanic Cell) is an electrochemical cell that uses spontaneous redox reactions to generate electricity. It consists of two separate half-cells.

**Redox Reaction:** A redox reaction is defined as a reaction in which oxidation and reduction take place simultaneously. In fact, both these processes take

place simultaneously. For example in the reaction of Copper oxide and Hydrogen.

**Statement 3 is incorrect:** The cathode is the positively charged electrode, the one to which electrons arrive (generally copper). The anode is the negatively charged electrode, which 'supplies' electrons

**Statement 4 is correct:** The energy imparted to the electrons by the half-cells is called the source voltage (previously called the electromotive force). The terminal voltage is like a driving force that pushes the electrons from the anode to the cathode. In ideal conditions, the source voltage is equal to the terminal voltage.

**Directions for questions 86 to 90:** Each question given below consists of a statement followed by two conclusions

numbered I and II. You have to assume everything in the statement to be true and then consider the two conclusions and decide which of them logically follows beyond a reasonable doubt from the information given in the statement. Give your answer as

- (a) if only conclusion I follows.
- (b) if only conclusion II follows.
- (c) if both I or II follows.
- (d) if neither I nor II follow.

86. Statement:

Maruti Suzuki is preparing to roll out its compact car, A-star, in mid-November, this year in India. A-star will be the eighth model to be launched by Suzuki in less than 40 months.

Conclusions:

- i) There is huge demand for new models of the cars in India.
- ii) Suzuki had launched its first car three years ago

Answer: B

87. Statement:

Experts say work overload leads to stress. But some celebrities say that they find work an antidote to stress.

Conclusions:



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- i) Some celebrities are overloaded by work.
- ii) Experts do not judge properly every time.

Answer: b

88. Statement:

Start to think of travelling by train for a holiday. A train journey can give one a better view of places on the way which an air journey cannot give.

Conclusions:

- i) While going for a holiday, people want to enjoy the view of the places on the way.
- ii) People should not travel by air when they are going for a holiday.

Answer: d

89. Statement: The demand for CNG vehicles is increasing day by day as compared to the production of CNG.

Conclusion:

- i) Government has increased the number of plants for CNG production.
- ii) The price of CNG is increasing day by day due to the increasing demand.

Answer: c

90. Statement: India is a country of various castes and creeds.

Conclusion:

- i) All castes people should adapt to multiple cultures.
- ii) All over the world people are of different castes and creeds.

Answer: d

**Directions for questions 91 and 92:** Each of the following questions consists of some statements followed by some conclusions. Consider the statements to be true. Find out which of the conclusions logically follow the given statements beyond a reasonable doubt and choose the proper alternative from the given choices.

91. Statement:

The police would allow the leader of the protestors to give a signed protest note at the gates of an embassy. Flags are allowed to be burnt, but the men in uniform

are harsh with anyone who tries to set ablaze the Indian tricolour.

Conclusions:

- i) The embassies are of foreign countries and are in India.
- ii) Those who want to protest against foreign countries do not burn Indian flags.
- iii) Burning flags of foreign countries is not an offence.

Select the correct answer:

- (a) All follow
- (b) Only I and III follow
- (c) Only I follow
- (d) Only III follows

Answer: b

92. Statement:

The United Nations has released a \$1 stamp to honour Mahatma Gandhi's efforts to promote non-violence. October 2nd, the birth date of Mahatma Gandhi, has already been named the International Day of Non-Violence.

Conclusions:

- i) Countries all over the world honour the policy of non-violence.
- ii) The United Nations has declared October 2<sup>nd</sup> as the International Day of Non-violence
- iii) The United Nations wants every country to adopt the non-violence policy.

Select the correct answer:

- (a) Only II and III follow
- (b) Only I follows
- (c) Only II follows
- (d) Only III follows

Answer: d

**Directions for questions 93 to 100:** Below in each question are given two statements I and II. These statements may be either independent causes or may be the effects of independent causes. One of the statements may be the effect of the other statement. Read both the statements and decide which of the following answer choices correctly depicts the relationship between these two statements.

- (a) if statement I is the cause and statement II is its effect.



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- (b) if statement II is the cause and statement I is its effect.
- (c) if both the statements I and II are effects of some common cause.
- (d) if both the statements I and II are effects of independent causes.

93. Statement:

- i) Norms and guidelines help children learn mutual respect, responsibility and cooperation.
- ii) There are times when the enforcement of norms lead to conflicts.

Answer: c

94. Statement:

- i) The single child family seems to be fast becoming the norm in the present-day urban set up.
- ii) People think that parenting is easier when they have only one child.

Answer: b

95. Statement:

- i) English-medium schools and institutes teaching spoken English, are mushrooming even in small towns.
- ii) Today, more than ever before, there is a craving among people to learn and speak English.

Answer: b

96. Statement:

- i) The shortage of employable talent has become severe.
- ii) There are more job opportunities than there are qualified professionals.

Answer: a

97. Statement:

- i) The Business Process Outsourcing (BPO) sector is on a hiring spree as it is likely to employ 23 lakh people by 2010.
- ii) Soaring property prices have led the companies to move to Tier II and Tier III cities.

Answer: d

98. Statement 1: The company has decided to increase the salary of its employees.

Statement 2: The employees threatened to go on a strike if their demands for a salary hike were not met.

Answer: a

99. Statement 1: The government has imposed a fine on people who litter in public places.

Statement 2: The cleanliness of public places has improved significantly in the recent past.

Answer: a

100. Statement 1: The government has announced a reduction in the interest rates.

Statement 2: The number of people taking loans has increased in the recent past.

Answer: a