SFG – FRC for CSE 2024 | Geography #1 – Solutions | ForumIAS

Q.1)
Solution: (c)
Exp) Option c is the correct answer
Statement 1 is correct: P waves, or Primary waves, are the first waves to arrive at a seismograph. P waves are the fastest seismic waves and can move through solid, liquid, or gas. They leave behind a trail of compressions and rarefactions on the medium they move through. P waves are also called pressure waves for this reason.
Statement 2 is correct: P waves are longitudinal waves, which means that the particle motion occurs parallel to the direction of wave propagation. These waves are compression waves, where particles oscillate back and forth in the same direction that the wave is traveling. As a result, the individual particles vibrate to and fro in the direction of wave propagation. On the other hand, S waves are transverse waves, where particle motion occurs perpendicular at right angles) to the direction of wave propagation. These waves cause the particles to move up and down or side to side perpendicular to the direction of the wave. Therefore, in S waves, the particles vibrate up and down at right angles to the direction of wave propagation.

Q.2)
Solution: (b)
Exp) Option b is the correct answer.
Statement 1 is incorrect. Of the total freshwater, 69% resides in glaciers, 30% underground, and less than 1% is located in lakes, rivers, and swamps. Thus, the amount of water in rivers and lakes is less than amount of groundwater.
Statement 2 is correct. Of the total freshwater, 69% resides in glaciers and 30% underground. Polar ice caps and glaciers has more water than groundwater.

Q.3)
Solution: (a)
Exp) Option a is the correct answer.
Statement 1 is correct. Tropical deserts are mostly located between 100 to 300 north and south of Equator on the western margins of the continent. These regions lie in the belt of the trade winds. These winds blow from east to west. These winds shed their moisture on the eastern side of the continents. By the time they reach to the western margin of the continents, they had shed their moisture and hence do not cause any rainfall. Thus, most of the tropical deserts like The Sahara Desert, the Kalahari Desert, West Australian desert etc. are located on the western margin of the continent. Moreover, these deserts also lie on the leeward side of the mountains and hence the region is also hot and dry.
Statement 2 is incorrect. The average annual rainfall in East Himalayan region is 10,000 mm (390 inches). The Bay of Bengal Branch of Southwest Monsoon is the cause of high rainfall in the north-east Himalayas. The northeast monsoon is confined to south India and brings rainfall from October to December over Tamil Nadu, Puducherry, Karaikal, Yanam, Andhra Pradesh, Kerala, Mahe and south interior Karnataka.

Q.4)
Solution: (d)
Exp) Option d is the correct answer answer.
All the above are responsible for bringing dynamic changes on the surface of the earth. Transfer from potential to kinetic energy results in dynamic changes.
Option 1 is correct. Electromagnetic radiation from the sun is source of heat and energy on Earth. This energy is source of all life on earth. It leads to precipitation and weathering of different surfaces. Option 2

is correct. Geothermal energy is heat derived within the sub-surface of the earth. It leads to melting of ice caps, volcanism and other dynamic changes.
Option 3 is correct. Due to the gravitational forces, the Sun, planets, and their moons interact with each other in a way, so that the Solar system is stable. The tides in the oceans are caused by gravitational force which leads to erosion and deposition.
Option 4 is correct. Movements of plates leads to formation of islands, mountains, volcanoes, earthquakes.
Option 5 is correct. Rotation of earth causes day and night, it also results in pressure differences due to differential heating of earth surface. This cause winds to flow and weathering of surfaces, as prominently seen in deserts. Rotation also produces Coriolis affect, which affects the movement of ocean currents.
Option 6 is correct. Revolution of the earth results in different seasons. When surfaces are exposed to different conditions it affects their structural integrity and aids in erosion.

Q.5)
Solution: (a)
Exp) Option a is the correct answer.
Statement 1 is correct: The intensity of an earthquake is measured by the Mercalli Scale. It measures the energy released during earthquakes. The intensity scale takes into account the visible damage caused by the event.
Statement 2 is correct: Earthquake's magnitude is the measurement of energy released. The more magnitude on the Richter scale, the more energy released by the earthquakes.
Statement 3 is correct: The Richter magnitude of an earthquake is determined from the logarithm of the amplitude of waves recorded by seismographs. Earthquake magnitude is a measure of the size or amplitude of the seismic waves generated by an earthquake.
Statement 4 is incorrect: Increase in magnitude by one integer on Richter scale represents a tenfold increase in the measured amplitude and 32 times not 100 times) more energy released.

Q.6)
Solution: (d)
Exp) Option d is the correct answer.
The Tropical Savanna Region is known as the 'Land of Big Games'. The savanna is known as the 'land of big game country' as thousands of animals are trapped or killed each year by people from all over the world. Carnivorous animals like lions, leopards, and tigers are present in the region and feed on deer, zebra and other herbivores

Q.7)
Solution: (c)
Exp) Option c is the correct answer.
Option a is incorrect: Temperature of deserts can be less than 420 C. Temperature generally falls at night in tropical deserts.
Option b is incorrect: Plants are also found in deserts but adapted as per the environment. For e.g. the leaves of desert plants are modified into spines to reduce the rate of transpiration from leaves.
Option c is correct: Most experts agree that a desert is an area of land that receives not more than 25 cm 10 inches) of precipitation a year. The amount of evaporation in a desert often greatly exceeds the annual rainfall. In all deserts, there is little water available for plants and other organisms.
Option d is incorrect: Sand barrows are commonly found in deserts, but it is a necessary condition but not sufficient condition. Sand burrows can also be found in the region outside the deserts such in the coastal areas, but they are not considered deserts.

Q.8)
Solution: (d)
Exp) Option d is the correct answer.
Option a is incorrect: Lava is molten rock that has erupted from a volcano. It is typically very hot, with temperatures ranging from 700 to 1,200 degrees Celsius. Lava can be fluid or viscous, depending on its composition and temperature. Fluid lava can flow long distances, while viscous lava is more likely to form thick piles or domes around the volcano.
Option b is incorrect: Basalt is a dark-colored, fine-grained igneous rock formed from the rapid cooling of low-viscosity lava rich in magnesium and iron mafic lava) exposed at or very near the surface of a rocky planet or moon. More than 90% of all volcanic rock on Earth is basalt.
Option c is incorrect: Obsidian is a volcanic glass that is formed when lava cools very quickly. It is typically black or dark gray in color, but it can also be green, brown, or red. Obsidian is very hard and sharp. It is formed when lava flows over water or other cold surfaces. The rapid cooling of the lava prevents the formation of crystals, resulting in a glassy texture. Obsidian can also be formed when lava erupts from a volcano and is cooled by the air.
Option d is correct: The molten material found inside the Earth is called magma. Magma is a mixture of molten and semi-molten rock, minerals, and dissolved gases. When magma rises to the surface of the Earth and erupts from a volcano, it is called lava.

Q.9)
Solution: (d)
Exp) Option d is the correct answer.
Options 1 and 2 are correct. Tides are the rise and fall of sea levels caused by the combined effects of the gravitational forces exerted by the moon and the sun, and the rotation of the earth.
Option 3 is correct. Tides occur due to an imbalance between the various forces acting on the ocean water at a point in time. **In general, the tide-generating force is the difference between these two forces; i.e. the gravitational attraction due to the mass of the moon and the centrifugal force due to rotation of the earth.** Together, the gravitational pull and the centrifugal force are responsible for creating the two major tidal bulges on the earth. On the side of the earth facing the moon, a tidal bulge occurs while on the opposite side though the gravitational attraction of the moon is less as it is farther away, the centrifugal force causes tidal bulge on the other side.

Q.10)
Solution: (a)
Exp) Option a is the correct answer.
Options 1, 2 and 3 are correct. Coral reefs ideally require sunlight, clean water to sunlight through, Salt water, and abundant Planktons. In India, the major reef formations are found in the **Gulf of Mannar**, Palk bay, **Gulf of Kutch**, **Andaman and Nicobar Islands** and the Lakshadweep islands.
Option 4 is incorrect. Due to the presence of high volume of freshwater, **coral reefs are not formed in Sunderbans.**

Fig: Distribution of coral reefs along Indian Coast

Q.11)
Solution: (d)
Exp) Option d is the correct answer.
Statement 1 is correct: Ocean currents are indeed slow-surface movements of water in the ocean, often covering vast distances and playing a crucial role in the Earth's climate system.
Statement 2 is correct: Ocean currents assist in maintaining the Earth's heat balance by redistributing heat from the equator toward the poles and vice versa. For example, the Gulf Stream is a warm current that flows from the Gulf of Mexico to the North Atlantic Ocean. It helps to keep Western Europe much warmer than it would be otherwise.
Statement 3 is correct: Prevailing winds are the winds that blow in a consistent direction over a particular region. The wind exerts frictional drag on the ocean's surface, causing the movement of surface waters in the direction of the wind. For example, the Trade Winds are steady winds that blow from east to west in the tropics. They create a strong current in the Atlantic Ocean called the North Equatorial Current.
Statement 4 is correct: Ocean currents are affected by the configuration of the ocean, including factors like the shape of coastlines, the presence of underwater features, and the depth contours of the ocean floor. These factors can influence the direction, strength, and behavior of ocean currents.

Q.12)
Solution: (b)
Exp) Option b is the correct answer.
The cold current of the South Atlantic Ocean is the Benguela Current. This current flows northward along the eastern portion of the South Atlantic Ocean gyre, extending from Cape Point in the south to the Angola-Benguela front in the north (around 16°S latitude). The Benguela Current is driven by prevailing south easterly trade winds and is associated with coastal upwelling, which brings cold, nutrient-rich waters to the surface, supporting a productive marine ecosystem along the southwestern African coast.

Q.13)
Solution: (b)
Exp) Option b is the correct answer.

When the density in the sea increases, then Salinity increases but depth decreases. When sea density increases, it's primarily due to elevated salinity. This higher salinity, caused by dissolved salts, adds mass to the water, making it denser. Denser water, being heavier, sinks beneath less dense water. This occurs because more particles, like dissolved salts, are packed into the same volume of water. **This increased particle concentration makes the water more compact, occupying less space for the same mass.** Think of it as denser water squeezing into the space occupied by less dense water, effectively displacing it. **Consequently, the surface layer becomes shallower in the region where densification happens, leading to a reduction in the sea column's depth.**

Q.14)
Solution: (c)
Exp) Option c is the correct answer.
The continental shelves are characterized by a **gentle slope rather than abrupt falls** towards the continental slopes. The continental shelves are often **covered with varying thicknesses of sediment** that have been transported by **rivers, glaciers, and other natural processes.**

Q.15)
Solution: (d)
Exp) Option d is the correct answer
Isohalines are lines that join points of equal salinity in an aquatic system. They are used to map the distribution of salinity in the ocean and other bodies of water.

Q.16)
Solution: (c)
Exp) Option c is the correct answer
Gravitational pull by the Sun and Moon primarily affects ocean tides. The gravitational forces exerted by these celestial bodies cause the water levels to rise and fall in the oceans, resulting in the formation of tides. **While tides can indirectly affect ocean currents by altering water levels, they do not directly drive the movement of water over large distances as ocean currents do**

Q.17)
Solution: (c)
Exp) Option c is the correct answer
Statement I is true: The Kuroshio is a warm North-flowing ocean current on the West side of the North Pacific ocean. It is formed by the North Equatorial Current, which is a warm current that flows from the west to the east in the Pacific Ocean.
Statement II is false: The presence of volcanoes at the bottom of the Sea of Japan does not contribute to the warmth of the Kuroshio Current. **The Kuroshio Current is warm because it originates in the**

tropics, where the water is warm

Important Tips

The Kuroshio Current begins near the **Philippines and flows past Taiwan and Japan.**
It then merges with the Oyashio Current off the coast of Japan to form the North Pacific

The Kuroshio Current is about 1,000 kilometers wide and 200 meters deep. It flows at speeds of to 2 meters per second.

The Kuroshio Current is a warm current, with temperatures that can reach up to 25 degrees Ce

This warm water helps to keep the coastal regions of Japan warm, even though they are located similar latitudes to Alaska and Siberia.

In the absence of Cold Labrador Current, which one among the following would happen?

Q.18)
Solution: (d)
Exp) Option d is the correct answer.
Statement 1 is incorrect: Tropical rain forest soil is very poor in nutrient which are required by plants to grow. This is due to acidic nature of soil and incessant rains. Potassium, calcium, magnesium and phosphorous are lost away due to leaching. Thus regeneration is very slow.
Statement 2 is correct: Tropical rainforests typically experience warm and consistent temperatures throughout the year. These elevated temperatures enhance the activity of soil microorganisms responsible for decomposing organic matter. Increased microbial activity leads to faster decomposition rates. Rainforests receive abundant rainfall, creating high levels of soil moisture. Moisture is crucial for microbial activity and the breakdown of organic matter. It facilitates the enzymatic processes involved in decomposition, providing a suitable environment for decomposers like bacteria and fungi.

Q.19)
Solution: (d)
Exp) Option d is the correct answer.
Whether a given cloud will heat or cool the surface depends on several factors, including the cloud's altitude, its size, and the make-up of the particles that form the cloud.
Statement 1 is incorrect: Low, thick clouds primarily reflect solar radiation and cool the surface of the Earth.
Statement 2 is incorrect: High, thin clouds primarily **transmit incoming solar radiation**; at the same time, they trap some of the outgoing infrared radiation emitted by the Earth and radiate it back downward, thereby **warming the surface of the Earth**.

Q.20)
Solution: (b)
Exp) Option b is the correct answer.

The South Atlantic and South-Eastern Pacific are as void of cyclonic activity largely due to the ITCZ having a tendency to stay near or north of the equator.
For a tropical cyclone to occur in South Atlantic and South-Eastern Pacific regions, a broad convergence zone is needed to reach about 5 degrees of latitude away from the equator in order for the Coriolis Force to have sufficient intensity to organize a full-fledged tropical cyclone, and the Atlantic ITCZ almost never shifts that far south

Q.21)
Solution: (d)
Exp) Option d is the correct answer.
Throughout the year, different parts of Earth receive the Sun's most direct rays. So, when the North Pole tilts toward the Sun, it's summer in the Northern Hemisphere and the days are longer in the Northern Hemisphere. Similarly, when the South Pole tilts toward the Sun, it's winter in the Northern Hemisphere and nights are longer in the Northern Hemisphere. Thus, Revolution of Earth on it's tilted axis causes variations in the length of daytime and night time from season to season.
If the Earth was not tilted on its axis, it would be permanently hot at the equator and cold at the poles. Also, the precipitation patterns would remain the same throughout the year.

Q.22)
Solution: (d)
Exp) Option d is the correct answer.
Following are leaf modifications of desert plant to inhibit water loss for adaptations and survival in deserts:
Statement 1 is correct: Wax coatings on leaves prevent water loss through evaporation, which in the hot desert can cause loss of water from both the surface and the inside of leaves. **Leaves are also smaller on desert plants**, further reducing the possibility for water loss.
Statement 2 is correct: Deciduous plants in desert ecosystems have adapted through the activity of their leaves. Leaves on these plants are typically **smaller and coated with wax** to prevent evaporation.
Plants such as aloes are equipped with fleshy leaves that contain much of their water supply. Because of their moist inner bodies, these plants are called succulents. They typically feel spongy and when cut open are filled with a pulpy flesh, **protected by a waxy outer layer.**
Statement 3 is correct: Many plants in the desert conserve water by **not having any leaves at all**. Cacti are the most prolific of this plant type. Many cacti have **spines in place of leaves,** which conduct photosynthesis and catch dew when the climate is right. These small structures also reflect light, further reducing water loss. During heavy rains, cacti will grow temporary root systems and absorb water. They will then shed the roots when the ground has dried.

Q.23)
Solution: (a)
Exp) Option a is the correct answer.
The annual range of temperature is defined as the difference between the hottest and coldest months at a place, taking monthly mean temperatures in each case. It is given approximately by the difference between the average of the January maximum and minimum temperatures, and the corresponding average for July.
Statement 1 is correct. The continents get heated faster and get cooled faster in comparison to the Oceans. The annual range of temperature is high in the interior of the continent because places located in the interior of the continent are far away from the moderating influence of the sea.

Statements 2 is incorrect. Altitude affects the daily range of temperature and annual mean temperature but has negligible impact on annual range of temperature. Latitude affects the annual range of temperature. The annual range of temperature increases with increasing latitude.

Statement 3 is incorrect. Wind is generally stronger near the coasts compared to interior areas of continents.

Statement 4 is incorrect. Rainfall in the interiors of the Continents is generally low as compared to Coasts. It is because the rain bearing winds from seas and oceans tend to loss most of the moisture till they reach the interiors.

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Q.24)

Solution: (d)

Exp) Option d is the correct answer.

Statement 1 is correct. Equatorial forests are found within 5 degrees north and south of the equator. Primary tropical rainforest is vertically divided into at least five layers: the overstory, the canopy, the understory, the shrub layer, and the forest floor. **The canopy is the dense ceiling of closely spaced trees and their branches.** It is the primary layer of the forest and resembles a roof of the forest.

Statement 2 is correct. Tropical rainforests support the greatest diversity of living organisms on Earth. **Although they cover less than 2 percent of Earth's surface, rainforests house more than 50 percent of all plants and animals found on land.** The primary reason behind this abundance of diversity is the high amount of sunlight this region receives.

Statement 3 is correct. An important characteristic of the canopy system is the presence of plants known as epiphytes, that grow on canopy trees. Epiphytes are not parasitic because they draw no nutrients away from the host, but climb the host tree to access direct sunlight.

Q.25)

Solution: (d)

Exp) Option d is the correct answer.

All the statements are incorrect.

Thunder is caused by the rapid expansion of the air surrounding the path of a lightning bolt. It is caused by intense convection on moist hot days. A thunderstorm is a well-grown cumulonimbus cloud producing thunder and lightning.

Many small bits of ice or water droplets(frozen raindrops) bump into each other as they move around in the air. All of those collisions create an electric charge. After a while, the whole cloud fills up with electrical charges.

The positive charges or protons form at the top of the cloud and the negative charges or electrons form at the bottom of the cloud. Since opposites attract, that causes a positive charge to build up on the ground beneath the cloud.

The grounds electrical charge concentrates around anything that sticks up, such as mountains, people, or single trees. Once the negative charge at the bottom of the cloud gets large enough, a flow of negative charge called a stepped leader rushes toward the Earth. The positive charges at the ground are attracted to the stepped leader, so positive charge flows upward from the ground. When the stepped leader and the positive charge meet, a strong electric current carries positive charge up into the cloud. This electric current is known as the return stroke. We see it as the bright flash of a lightning bolt.

Q.26)
Solution: (d)
Exp) Option d is the correct answer.
The **sturdy root system of mangrove trees help form a natural barrier** against disasters such as tsunamis and floods. River and land sediment is trapped by the roots, which stabilizes shoreline, coastline areas and slows erosion.

Q.27)
Solution: (c)
Exp) Option c is the correct answer.
Statement 1 is correct. The stratosphere is very dry, air in lower stratosphere contains little water vapor and there is almost complete absence of thunderstorms. Less water vapour means less drag which helps maintain fuel efficiency.
Statement 2 is correct. Unlike the troposphere, there is almost complete absence of vertical winds or thunderstorms in the lower stratosphere.

Q.28)
Solution: (a)
Exp) Option a is the correct answer.
Statement 1 is correct. The sub-tropical high-pressure belts are adiabatic in nature. Hence, they bring little rainfall to the African and Eurasian desert region. Majority of deserts are located in the subtropics due to the warming and drying effect of the subsidence generated by high pressure. The Sahara Desert and Arabian Deserts are good examples of subtropical deserts that largely owe their existence to this climatological feature.
The air converges and rise at the equator due to intense heating, and circulate to the edge of the subtropics where it descends again. This is called the Hadley Cell, and it creates the subtropical highpressure belt, where high pressure and descending air are found for much of the year.
Statement 2 is incorrect. Warm ocean currents aren't a necessary condition for the desert belt. For instance, Gobi cold desert doesn't come under the influence of any warm currents. Moreover, African and Eurasian desert belts lie under the influence of cold ocean currents.

Q.29)
Solution: (d)
Exp) Option d is the correct answer.
Statement 1 is incorrect. La Nina is characterised by unusually **cold ocean temperatures in the Equatorial Pacific** compared to El Nino Whereas El Nino is characterized by unusually warm ocean temperatures in the Equatorial Pacific.
Statement 2 is incorrect. La Nina is favourable to Indian monsoon whereas, El Nino has adverse effect on south-west monsoon.

Q.30)
Solution: (a)
Exp) Option a is the correct answer.
Statement 1 is correct. Land comprises only 19.1% of Southern Hemisphere, In Northern Hemisphere, the majority of area is composed of land masses. **Less landmass in Southern Hemisphere results in lesser frictional drag in motion of westerlies, thus resulting in stronger and persistent Westerlies.**

Statement 2 is incorrect. Coriolis force is equal in both the hemispheres at their respective latitudes. The magnitude of the Coriolis force depends on the speed of the object and its latitude. The Coriolis force is zero at the equator and increases toward the poles.

Q.31)
Solution: (c)
Exp) Option c is the correct answer.
Monsoon refers to the seasonal change in the direction of the prevailing winds of a region. Monsoons cause wet and dry seasons throughout much of the tropics. Monsoons are most often associated with the Indian Ocean. Monsoons always blow from cold to warm regions. The summer monsoon and the winter monsoon determine the climate for most of India and Southeast Asia.

Q.32)
Solution: (c)
Exp) Option c is the correct answer.
Statement 1 is correct. The atmosphere is generally heated from the terrestrial radiation emitted by the Earth's surface as **gases in the atmosphere do not absorb the incoming solar radiation**. Therefore, temperature is maximum near the surface of the Earth.
Statement 2 is incorrect. As the air rises upwards it cools down, as result of this its water holding capacity decreases.
Statement 3 is correct. Due to decreased atmospheric pressure the density of air decreases as we go upward due to low pressure and hence, less heat can be absorbed. Also, as the warm air rises it cools down adiabatically.

Q.33)
Solution: (d)
Exp) Option d is the correct answer.
The tropical savanna climate has alternating dry and wet seasons. The wet summer season lasts 6 to 8 months and during these days, there is plenty of rainfall. Winter lasts for 4 to 6 months and there might be no rains in winter this results in frequent forest fires.
Option a is incorrect. Rainfall throughout the year is a characteristic of Equatorial region.
Option b is incorrect. The Mediterranean region falls under the influence of wet westerlies during winter season and receive rainfall in winters only.
Option c is incorrect. Tropical Savannah region experience dry conditions for a longer duration than wet conditions. Extremely short dry season is a characteristic of regions experiencing Tropical Monsoon climate.

Q.34)
Solution: (a)
Exp) Option a is the correct answer.
The Horse Latitudes are subtropical **high-pressure belts** that are located at approximately **30°–35° north and south latitude**. They are so named because they were once a common place for sailing ships to become becalmed, or stuck, for weeks or even months. This was because the high pressure in the Horse Latitudes creates light winds and calm seas.

Q.35)
Solution: (a)
Exp) Option a is the correct answer.
Assertion is correct: The amount of moisture in atmosphere is related to latitude because the temperature is a function of latitude and moisture holding capacity depends upon temperature.
Reason is correct explanation for Assertion: The amount of moisture that the atmosphere can hold is related to temperature. Warm air can hold more moisture than cold air. This is why the air in tropical regions is more humid than the air in polar regions. As a result, the tropics have more moisture in the atmosphere than the poles. This is why there is more rainfall in the tropics than at the poles.

Q.36)
Solution: (a)
Exp) Option a is the correct answer.
Assertion(A) is correct: Wind patterns are clockwise in the northern hemisphere and anti-clockwise in the southern hemisphere. This is due to the **Coriolis effect**, which is a result of the Earth's rotation. The Coriolis effect deflects moving objects to the right in the northern hemisphere and to the left in the southern hemisphere.
Reason(R) is correct explanation for Assertion (A): The directions of wind patterns in the northern and the southern hemisphere are governed by the Coriolis effect. The Coriolis effect is the main factor that determines the direction of wind patterns on Earth. The Earth's rotation causes the air to move at different speeds at different latitudes. The air at the equator moves faster than the air at the poles. This difference in speed causes the air to deflect to the right in the northern hemisphere and to the left in the southern hemisphere.

Q.37)
Solution: (a)
Exp) Option a is the correct answer.
Assertion is correct: The surface winds spiral inwards upon the centre of the cyclone. This is true because the air pressure at the center of a cyclone is lower than the air pressure at the surrounding edges. This difference in air pressure creates a pressure gradient, which causes the air to flow from the areas of high pressure to the areas of low pressure. As the air flows towards the center of the cyclone, it spirals inwards due to the Coriolis effect.
Reason is correct explanation for Assertion: Air descends at the centre of the cyclone. This is also true because the air at the center of the cyclone is cooler and denser than the air at the surrounding edges. As a result, the air at the center of the cyclone sinks. This sinking air then spreads out at the surface, causing the surface winds to spiral inwards.

Q.38)
Solution: (b)
Exp) Option b is the correct answer.
Assertion (A) is correct. The 60°–65° latitudes in both hemispheres have a low-pressure belt instead of a high-pressure belt. This is known as the subpolar low-pressure belt.
Reason (R) is correct. Low-pressure areas are more stable over oceans than on land. This is because water has a higher heat capacity than land, meaning that it takes more energy to heat water than land. As a result, water heats up and cools down more slowly than land. This means that low-pressure areas over oceans are more likely to persist than low-pressure areas over land.

Reason (R) is not the correct explanation for Assertion (A). The subpolar low-pressure belt is not caused by the stability of low-pressure areas over oceans. Instead, it is caused by the convergence of warm, moist air from the tropics and cold, dry air from the poles. The convergence of these two air masses creates a zone of rising air. As the air rises, it cools and condenses, forming clouds and precipitation. This process releases heat into the atmosphere, which helps to maintain the low pressure in the subpolar low-pressure belt.

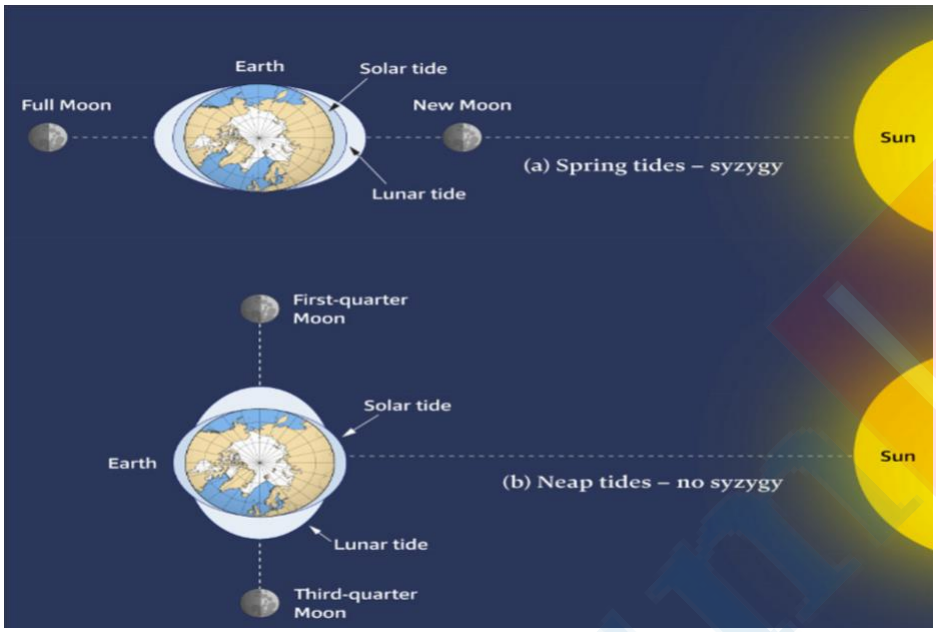
Q.39)
Solution: (d)
Exp) Option d is the correct answer.
Statement 1 is incorrect: Equatorial regions have a very small variation in temperature and day length throughout the year. There is **no clear distinction of seasons in the equatorial regions**, except for the wet and dry periods that depend on the rainfall pattern.
Statement 2 is incorrect: Mediterranean region has a **dry and hot summer, and a mild and wet winter**. The rainfall is mostly concentrated in the winter months, while the summer months are usually dry.
Statement 3 is correct: China type climate is influenced **by the monsoon winds that change direction** with the seasons. The China type climate has a hot and rainy summer, and a cold and dry winter. The rainfall is distributed throughout the year, but it is more abundant in the summer months.
Statement 4 is correct: Tropical highlands have a **large variation in altitude, which affects the temperature and precipitation**. The higher the altitude, the lower the temperature and the higher the precipitation. Therefore, the tropical highlands have different climate zones depending on the elevation.

Q.40)
Solution: (c)
Exp) Option c is the correct answer.
The **phenomenon of El-Nino and Southern Oscillations, which is detected in the last decade, is associated with occasional weak monsoon rains in the Indian subcontinent**. ENSO is associated with occasional weak monsoon rains in the Indian subcontinent, especially during El-Nino years. This is because El-Nino reduces the temperature contrast between the land and sea, which weakens the low pressure system over India that attracts moist winds from the Indian Ocean. El-Nino also shifts the rainfall patterns over the Pacific and Indian Oceans, resulting in less rainfall over India and more rainfall over Indonesia and Australia.

Q.41)
Solution: (b)
Exp) Option b is the correct answer.
Statements 2, 3 and 4 are correct: The Roaring Forties are the prevailing westerly winds that blow between 40-50 **degrees south latitude**. They are **strong and persistent**, and they can reach speeds of up to 100 knots. The westerlies are caused by the temperature gradient between the equator and the poles. Their direction is generally from north-west to east in the southern hemisphere. Overcast skies, rain and raw weather are generally associated with them.
Statement 1 is incorrect. The Roaring Forties **only blow in the Southern Hemisphere**.

Q.42)
Solution: (c)
Exp) Option c is the correct answer.

Statement (A) is correct: Neap tides occur when the sun and moon are at right angles to each other (during the first and third quarter moon phases). The gravitational pull of the sun partially cancels out the gravitational pull of the moon, resulting in lower high tides and higher low tides than usual.
Reason (R) is false: Neap tides actually occur during the first and third quarters of the moon when it appears "half full," not during the new moon. During the new moon, spring tides occur when the gravitational forces of the sun and moon combine to create higher high tides and lower low tides.



Q.43)
Solution: (a)
Exp) Option a is the correct answer.
Assertion (A) is true: Areas lying within **five to eight-degree latitude on either side of the equator receive rainfall throughout the year.** It is the region of Intertropical Convergence Zone (ITCZ), which is a belt of low pressure where the trade winds from both hemispheres meet and cause rising air, condensation, and precipitation.
Reason (R) is true: High temperature and high humidity cause convectional rainfall mostly in the noon near the equator, as the air on getting heated becomes light and rises in convection currents, forming cumulus clouds and heavy rainfall.

Q.44)
Solution: (d)
Exp) Option d is the correct answer
Option a is incorrect: Bhitarkanika mangroves, located in Odisha, India, is a significant mangrove ecosystem. While it experiences tidal fluctuations, it is not primarily characterized by repeated falls in sea level. Rather, it is influenced by the riverine system and is considered an important breeding ground for various species, including the endangered saltwater crocodile.
Option b is incorrect: Marakkanam salt pans, situated in Tamil Nadu, India, are salt marshes used for salt production. They are formed in low-lying coastal areas where seawater is allowed to evaporate, leaving behind salt crystals. However, these salt pans do not result from repeated falls in sea level but are created artificially by utilizing the existing seawater.

Option c is incorrect: Naupada swamp, also known as Naupada Wetland, is located in Odisha, India. It is a freshwater swamp and is not primarily influenced by repeated falls in sea level. Instead, it is formed by the inflow of freshwater from rivers and receives seasonal rainwater.

Option d is correct: The Rann of Kutch, situated in Gujarat, India, is the best example among the options provided. It is a vast seasonal salt marsh that experiences significant fluctuations in sea level due to its geological history. The Rann of Kutch was once an arm of the Arabian Sea, and as the sea level fell over time, it transformed into a marshy land. The region is known for its unique ecosystem, supporting a diverse range of flora and fauna, including migratory birds and endangered species. The Rann of Kutch is also famous for the annual Rann Utsav, a cultural festival that celebrates the vibrant traditions of the region.

Q.45)

Solution: (d)

Exp) Option d is the correct answer

Statement 1 is incorrect: Amarkantak is a pilgrim town in Anuppur, Madhya Pradesh, India. The Amarkantak region is a unique natural heritage area and is the meeting point of the Vindhya and the Satpura Ranges, with the Maikal Hills being the fulcrum.

Statement 2 is incorrect: The Billigirirangan hills, also known as Biligiriranga Hills or BR Hills, are not a part of the Satpura range. The Biligirirangana Hills or Biligirirangan Hills is a hill range situated in south-western Karnataka, at its border with Tamil Nadu (Erode District) in South India. The area is called Biligiri Ranganatha Swamy Temple Wildlife Sanctuary or simply BRT Wildlife Sanctuary.

Statement 3 is incorrect: The Sesachalam hills, also known as Tirumala hills, are not a part of the Western Ghats**.** Seshachalam Hills are hilly ranges part of the Eastern Ghats in southern Andhra Pradesh state, in southeastern India. The Seshachalam hill ranges are predominantly present in Tirupati district of the Rayalaseema region in Andhra Pradesh, India. **Thus None of the Statements are correct.**

Q.46)

Solution: (d)

Exp) Option d is the correct answer.

All of the given rivers are tributaries of Brahmaputra.

Option 1 and 3 are correct. Lohit originates in Tibet, flows through Arunachal Pradesh, before it is joined by Dibang in Assam where it flows into Brahmaputra. The Bhupen Hazarika Setu is constructed on River Lohit.

Option 2 is correct. Kameng river also called as Bharali is a right bank tributrary of Brahmaputra. It originates near Indo-Tibet border in Tawang and meets Brahmaputra near Tezpur in Assam

Q.47)

Solution: (a)

Exp) Option a is the correct answer.

Option 1 and 2 are correct. The Eastern Himalayan broadleaf forests are diverse and species-rich, with a great diversity of oaks and rhododendrons in particular. The ecoregion has two broad forest types: evergreen and deciduous. Evergreen forests are characterized by oaks together with Rhododendrons. In Western Himalayas, the evergreen broadleaf forests is dominated by oaks.

Option 3 is incorrect. Sandalwood is an evergreen tree which generally grows in the tropical dry, deciduous forests of Karnataka, Tamil Nadu, Kerala and Andhra Pradesh.

Q.48)
Solution: (a)
Exp) Option a is the correct answer
Statement 1 is correct. The Narmada and the Tapi flow through the rift valley**. The Narmada and The Tapti flow in trough faults**. They along with many small rivers discharge their waters in the Arabian Sea.
Statement 2 is incorrect. Narmada flows between Vindhyas in north and the Satpuras in south but this is not the reason for flowing towards West.
Statement 3 is incorrect. The Peninsular plateau consists of two broad divisions, namely, the Central Highlands and the Deccan Plateau. The part of the peninsular plateau lying to the north of the Narmada river, covering a major area of the Malwa plateau, is known as the Central Highlands. The flow of the rivers draining this region, namely the Chambal, the Sind, the Betwa and the Ken is from **southwest to northeast, thus indicating the slope.** Thus, the slope is towards northeast.

Q.49)
Solution: (c)
Exp) Option c is the correct answer.
Statement 1 is correct. The word monsoon is derived from the Arabic word 'Mausim' which means season. Monsoon refers to the seasonal reversal in the wind direction during a year. The Southern part of India, being near to the sea, gets rainfall early and for a **longer duration than in the northern part**. As rain-bearing winds cross western ghats humidity decreases and so does rainfall in the northern part of India. The Southern part of India receives rainfall from the southwest monsoon and the retreating southwest monsoon (northeast monsoon).
Statement 2 is correct. The Bay of Bengal is the main branch of the monsoon winds which moves from northeast and then hits Himalayas to return westwards by covering the northern plains. As the winds move westward, their moisture contains tends to reduce as they cause rains along Indian subcontinent. So that the rainfall decreases from east to west in northern India. The Arabian Sea branch does not contribute much and exhaust most of its moisture when it hit Western Ghats.

Q.50)
Solution: (d)
Exp) Option d is the correct answer.
The Himalayas began forming in the Upper Cretaceous period (60 million years ago). **Young fold mountains have not yet undergone extensive erosional process of exogenic forces**, thus they have deep gorges, U-turn river courses, Parallel mountain ranges and steep gradients.
These features are generally absent in old fold mountains which are characterized by lower altitude, rounded peaks, gentle slopes and rolling hills.

Q.51)
Ans) b
Exp) Option b is the correct answer
The passage is primarily about the process of analyzing dreams and how it involves tracing the origin and associations of latent dream-thoughts. The following lines clearly highlight the key inference, "It follows, therefore, that in order to understand the latent dream-thoughts which have been brought to light by analysis, we must trace them back to their origin in the unconscious and follow the associations by which they have been displaced and transformed."

Q.52)

Ans) b

Exp) Option b is the correct answer

Statement 1 is incorrect: The passage does not mention that there are no alternative, less harmful methods of pest control. However, it implies that current methods are harmful and that alternative methods should be sought, as evidenced by the statement "They should not be called 'insecticides,' but 'biocides.'"

Statement 2 is correct: The passage explicitly states that the impact of pesticides goes beyond its intended objectives, such as killing "every insect, the 'good' and the 'bad,' stilling the song of birds and the leaping of fish in the streams, coating the leaves with a deadly film, and lingering on in soil."

Q.53)

Ans) d

Exp) Option d is the correct answer

The statement uses word generally and thus no extreme conclusion can be drawn from the above statement.

For Conclusion I: It clearly cannot be said that all successful people have good time management skills. Thus it does not necessarily follow.

For Conclusion II: No person who is bad at time management is successful is also an extreme statement and it cannot be said with certainty with the given statement. Thus the Conclusion II does not follow as well.

Q.54)

Ans) a

Exp) Option a is the correct answer

Let's assume the old playground has a length of L and a width of W, so its area is A = L*W.

After remodeling, the new length of the playground will be 1.3L (30% more than L), and the new width will be 0.9W (10% less than W).

The area of the new Playground will be A' = 1.3L*0.9W = 1.17A.

To keep the memorial, an area of 0.1A needs to be deducted from A', so the available area for children's playground A'' = A' – 0.1A = 1.17A – 0.1A = 1.07A.

Therefore, the new playground has 7% more area than old playground

So the answer is option a

Q.55)

Ans) b

Exp) Option b is the correct answer.

Letters	Mirror Images	Letters	Mirror Images	Letters	Mirror Images
A	A	J	ſ	S	Ƨ
B	ᗺ	K	ꓘ	T	T
C	Ↄ	L	⅃	U	U
D	ᗡ	M	M	V	V
E	Ǝ	N	И	W	W
F	Ⅎ	O	O	X	X
G	Ↄ	P	ꟼ	Y	Y
H	H	Q	Ọ	Z	Ƹ
I	I	R	Я		

Numbers	Mirror Images
1	ɪ
2	ƨ
3	ε
4	ㄣ
5	ƽ
6	ϭ
7	⁊
8	8
9	९

Letters	Mirror-Images	Letters	Mirror-Images	Letters	Mirror-Images
a	ɒ	j	ɾ	s	ƨ
b	d	k	ʞ	t	ƚ
c	ɔ	l	l	u	u
d	b	m	m	v	v
e	ɘ	n	n	w	w
f	ɟ	o	o	x	x
g	ϱ	p	q	y	ʏ
h	ɥ	q	p	z	ƹ
i	i	r	ɿ	-	-

To find the mirror image of the given combination "**ANS1024TAR**", we need to write this combination in reverse order and then replace each alphabet with its mirror image.
So, reversing the combination "ANS1024TAR" gives us "RAT4201SNA". Now, replacing each alphabet with its mirror image based on the above table:
Option a and c are eliminated as they are not in reverse order and in option d letters 1 and S are not in correct sequence, hence option b is the correct answer.

Q.56)
Ans) b
Exp) Option b is the correct answer
Let us say Selling price (SP1=SP2) of Both books is Rs 100.
If he makes profit of 20% on book1 then Cost price of book1 (CP1) can be found out by:
Profit= (SP-CP)/CP
0.2= (100-CP1)/CP1
CP1= 83.33
Similarly,
Loss= (CP-SP)/CP
0.2=(CP2-100)/CP2
CP2=125
CP1+CP2= 125+83.33
Overall Cost Price of two books = 208.33
Overall Selling Price of two books = 200
Thus, Overall, there is a loss
Loss= {(208.33-200)/208.33} * 100
Loss = 3.998 % or 4%

Trick: For such question there is always a loss of approx. $\frac{(\text{loss or profit}\%)^2}{100} = \frac{(20)^2}{100} = 4\%$

Q.57)
Ans) b
Exp) Option b is the correct answer
The passage explains that bureaucratic administration is based on technical and specialized knowledge of rules and impersonal criteria that apply to administrative functions. The specialized knowledge required for bureaucratic functioning can be learned and is based on specific technical features of administrative tasks and formalized regulations

Q.58)
Ans) c
Exp) Option c is the correct answer
Statement 1 is correct: This is evident in the passage's description of how the emergence of self-reflexive consciousness has led to the fragmentation and de-traditionalization of social life, erosion of traditional sources of authority, and the proliferation of choices and possibilities.
Statement 2 is correct: The passage clearly states that the ability to become conscious of their historical context is a unique feature of modern societies. This is evident in the passage's emphasis on the development of science and rise of individualism as the roots of self-reflexive consciousness. The passage argues that this consciousness has led to individuals and societies becoming aware of their historical situation and their place in the world.

Q.59)
Ans) d
Exp) Option d is the correct answer
The value of the first number = 2226
The value of the second number = 2529
The difference between two number = 2529 - 2226 = 303
Now,
Prime factorization of 303 = 101 × 3
The required three-digit number = 101
Now,
Dividing 2226 by 101,
= 2226 = (101 × 22) + 4
Dividing 2529 by 101,
= 2529 = (101 × 25) + 4
The value of remainder in each case, X = 4
Thus, the value of X is 4.

Q.60)
Ans) b
Exp) Option b is the correct answer
A number is divisible by 6 if it is divisible by both the numbers 2 and 3. The divisibility rule for 2 states that any number with the last digit of 0, 2, 4, 6, or 8 will be divisible by 2. A number is said to be divisible by 3 if the sum of all digits of that number is divisible by 3.
The number given is 62532915a.
Sum of the digits of the given number 62532915a is
⇨ 6 + 2 + 5 + 3 + 2 + 9 + 1 + 5 + a
⇨ 33 + a
we put the value of a from the numbers 0, 2, 4, 6 and 8
Now, when the largest digit 8 is placed in the place of a,
Then, the sum of the digits of the number becomes 33 + 8 = 41, which is not divisible by 3.
when the largest digit 6 is placed in the place of a,
Then, the sum of digits of the number becomes 33 + 6 = 39, which is divisible by 3
And, the number becomes 625329156, which is divisible by 6.
Thus, the value of a is 6.