Q.1)
Ans) a
Exp) Option a is the correct answer
Statement-I:

- The temperature contrast between continents and oceans is indeed greater during summer than in winter.
- This is due to the differences in how quickly land and water heat up and cool down (their "specific heat").
- During the summer, the land (continents) heats up more quickly and to a higher temperature than the water (oceans). Therefore, the temperature difference between them is greater.
- In contrast, during the winter, both land and water cool down, but land does so more quickly and to a lower temperature. However, this does not create as big a temperature difference as in the summer because the cooling of the water somewhat follows the cooling of the land. **Hence statement (I) is correct**

Statement-II:

- The specific heat of water is more than that of the land surface.
- Specific heat is a measure of how much heat energy is needed to raise the temperature of a substance.
- In this case, water has a higher specific heat than land, meaning it takes more heat energy to raise the temperature of water than it does to raise the temperature of land.
- This means that, for the same amount of sunlight energy, water will heat up less than land. Similarly, it takes more loss of heat for water to cool down than it does for land. **Hence statement (II) is correct**

The higher specific heat of water means that water changes its temperature more slowly than land, which leads to a greater temperature contrast between continents and oceans during the summer.

Q.2)
Ans) b
Exp) Option b is the correct answer
Ocean Mean Temperature (OMT) is an important climatic parameter required for atmospheric and oceanic studies like cyclone and monsoon predictions and ocean heat transport estimations.
Statement 1 is incorrect. OMT is measured up to a depth of 26°C isotherm, is seen at depths varying from 50-100 metres. During January-March, the mean 26°C isotherm depth in the South-western Indian ocean is 59 metres.
Statement 2 correct. OMT collected during January – March can be used in assessing whether the amount of rainfall in monsoon will be less or more than a certain long-term mean. Using OMT data collected during January-March 2018, it was able to predict with greater probability of the pattern of monsoon.

Q.3)
Ans) c
Exp) Option c is the correct answer.
The meeting of the cold and warm water, produces favourable conditions for the growth of plankton, on which fish depend directly or indirectly for their food supply. Thus, the areas where warm and cold currents meet are the best fishing grounds in the world.
For instance, Grand Banks in North America is an international fishing ground where the cold Labrador Current and the relatively warm Gulf Stream.

Q.4)
Ans) b
Exp) Option b is the correct answer.
Option 1 is correct. Rotation of Earth leads to Coriolis effect which influences direction of ocean currents. The Coriolis effect causes air and water to move towards the right in the northern hemisphere and the left in the southern hemisphere.
Option 2 is correct. Wind is the primary force driving surface currents in the ocean. Warm air masses form where the sun's radiation is most intense, which is at the equator, this becomes an area of low pressure. Cold air masses form at the poles, where the sun's radiation is less intense, this becomes an area of high pressure. **Rising warm air travels from low pressure to high pressure, resulting in wind.** The dominant wind patterns drive oceanic currents.
Option 3 is correct. The density of ocean water influences the speed of the ocean currents. Also, denser water tends to sink, while relatively lighter water tends to rise.
Option 4 is incorrect. Revolution of Earth does not influence the movement of Ocean Currents. Insolation, Planetary winds, Gravity, Salinity of ocean water, Shape of coastline are some other important factors which influence the movement of ocean currents.

Q.5)
Ans) b
Exp) Option b is the correct answer.
Statement 1 is incorrect. The current depth of Strait of Malacca is 25 metres, which prohibits entry of some of the biggest ships in the world. However, deepening it will not reduce navigation-time and distance to be travelled. **Statement 2 is correct**. The Kra Isthmus is the narrowest part of the Malay Peninsula. **Kra canal is a proposed canal which would reduce the travel time by eliminating need of going around the Malay peninsula, and reducing a distance of nearly 1,200 kilometres.**

Q.6)
Ans) 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.
Important Tips Factors Influencing Ocean Currents - Primary Forces:

- **Heating by Solar Energy:** Solar heating causes water to expand, creating a slight gradient where water flows downhill. Near the equator, ocean water is about 8 cm higher in level than in midlatitudes due to this expansion.
- **Wind:** Surface winds exert frictional drag on the ocean's surface, propelling the water beneath them. Wind direction and strength influence the movement of ocean currents.
- **Gravity:** Gravity's pull on water results in variations in gradient, contributing to the movement of ocean currents.
- **Coriolis Force:** The Coriolis effect causes moving water to deflect to the right in the Northern Hemisphere and to the left in the Southern Hemisphere, influencing the direction of ocean currents. Gyres, large circular currents, are formed as a result. **Secondary Forces:**
- **Differences in Water Density:** Variations in water density, primarily influenced by salinity and temperature differences, affect vertical ocean current movement. Dense, cold, and saline water tends to sink, while lighter, warmer, and less saline water rises.
- **Temperature of Water:** Cold-water currents form when polar cold water sinks and gradually moves toward the equator, while warm-water currents flow from the equator towards the poles, replacing sinking cold water. These temperature-driven movements help shape ocean currents.

Q.7)
Ans) b
Exp) Option b is the correct answer.
The change in the regular direction of ocean currents in the Indian Ocean is primarily due to the presence of the Monsoon drift. Monsoons are seasonal wind patterns that bring about a reversal in wind direction in the Indian Ocean region. During the summer monsoon, winds blow from the southwest to the northeast, causing surface currents to flow in the same direction. Conversely, during the winter monsoon, winds reverse direction, blowing from the northeast to the southwest, and this change in wind patterns leads to a reversal of ocean currents in the Indian Ocean. This seasonal variability in winds and currents is a distinctive feature of the Indian Ocean.

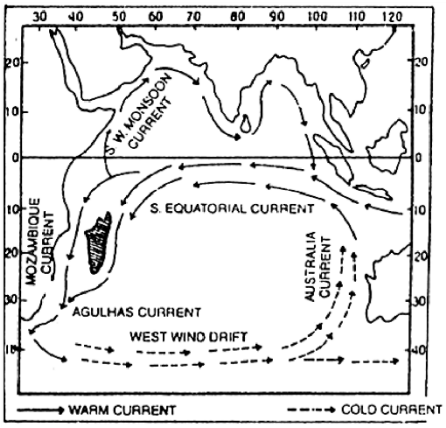
Q.8)
Ans) b
Exp) Option b is the correct answer.
The correct matching of List-I (Ocean) with List-II (Maximum Deepest Point) is as follows:
A. Pacific - 3. Mariana Trench
B. Arctic - 4. Molloy Deep
C. Indian - 1. Sunda Trench
D. Atlantic - 2. Puerto Rico Trench

Important Tips

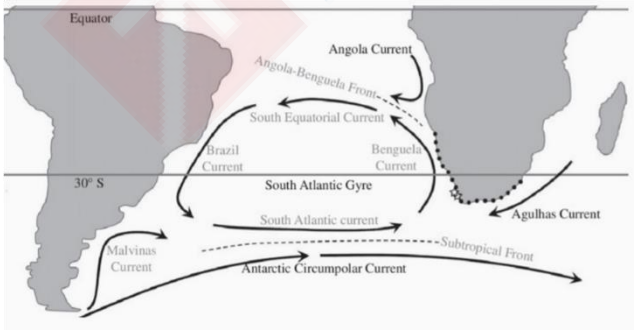
- **The Mariana Trench is an oceanic trench located in the western Pacific Ocean, about 200 km east of the Mariana Islands**; it is the deepest oceanic trench on Earth. It is crescent-shaped and measures about 2,550 km in length and 69 km in width. The maximum known depth is 10,984 m at the southern end of a small slot-shaped valley in its floor known as the Challenger Deep.
- **The Puerto Rico Trench is located on the boundary between the Caribbean Sea and the Atlantic Ocean.** The trench is 800 km long and has a maximum depth of 8,376 m. **This constitutes the single deepest point in the Atlantic Ocean.** This point is commonly referred to as the **Milwaukee Deep**, with the Brownson Deep naming the seabed surrounding it.

- **The Molloy Deep (also known as the Molloy Hole)** is a bathymetric feature in the Fram Strait, within the Greenland Sea east of Greenland and about 160 km west of Svalbard**. It is the location of the deepest point in the Arctic Ocean.** The outer rim of the trench is at a depth of 2,700 m and contains about 600 km2 inside the rim, descending to **approximately 5,550 m at its greatest depth. The basin floor measures about 220 km2 and is the deepest point in the Arctic Ocean.**

Q.9)
Ans) d
Exp) Option d is the correct answer.
The Benguela Current does not belong to the Indian Ocean. Benguela Current is a branch of the West Wind Drift of the Southern Hemisphere**. It is cold current that flows northward in the South Atlantic Ocean along the west coast of southern Africa nearly to the Equator before merging with the westward-flowing Atlantic South Equatorial Current.** The Benguela Current is known for its cool temperatures, relatively low salinity, and high plankton concentration, creating favorable conditions for fishing. **Agulhas Current, Mozambique Current and South Indian Ocean Current are ocean currents of Indian Ocean.**



Q.10)
Ans) c
Exp) Option c is the correct answer.
The Canary Current is a cold current that flows along the western coast of Africa, from the Canary Islands to Cape Verde. It is part of the North Atlantic Ocean gyre, not the South Atlantic Ocean gyre.
Benguela current, Brazil current and west wind draft are part of South Atlantic Ocean gyre.



Important Tips West Wind Drift:
- West Wind Drift, **also known as the Antarctic Circumpolar Current, is a major cold ocean**

current in the southern hemisphere.

- It flows from **west to east, generally between 40 and 60 degrees south latitude, encircling Antarctica**.
- It spans across the Atlantic, Pacific, and Indian Oceans, connecting these major ocean basins.
- The lack of landmasses in its route allows it to form a Circumpolar loop around Antarctica.
- **It plays a crucial role in preserving Antarctica's massive ice sheet by keeping warm ocean waters away from the continent.**
- The West Wind Drift **influences the formation of the Ross and Weddell gyres in the Southern Ocean.**
- Strong westerly winds and temperature differences between the Equator and poles drive the formation and intensity of this current.
- **The westerlies and trade winds, particularly the roaring forties and furious fifties, contribute to the current's flow, reaching speeds of 15 to 25 knots.**

Important Ocean Currents:

- **The Canary Current is a wind-driven surface cold current that is part of the North Atlantic Gyre.** This eastern boundary current branches south from the North Atlantic Current and flows southwest about as far as Senegal where it turns west and later joins the Atlantic North Equatorial Current. The current is named after the Canary Islands.
- **The Agulhas Current is the western boundary warm current of the southwest Indian Ocean.** It flows south along the east coast of Africa from 27°S to 40°S. It is narrow, swift and strong. **It is the largest western boundary current in the world ocean.**

• The Brazil Current is a warm water current that flows south along the Brazilian south coast to the mouth of the Río de la Plata. This current is caused by diversion of a portion of the Atlantic South Equatorial Current from where that current meets the South American continent.

Q.11)

Ans) d

Exp) Option d is the correct answer.

"Sodium chloride" contributes the maximum to the salinity of seawater. Sodium chloride, commonly known as table salt, accounts for approximately 77.7% of the total salts in seawater.

- Share of different salts is as shown below– • sodium chloride – 77.7%
- magnesium chloride–10.9%
- magnesium sulphate –.4.7%
- calcium sulphate – 3.6%
- potassium sulphate – 2.5%

Chlorine	18.97
Sodium	10.47
Sulphate	2.65
Magnesium	1.28
Calcium	0.41
Potassium	0.38
Bicarbonate	0.14
Bromine	0.06
Borate	0.02
Strontium	0.01

Important Tips Factors Affecting Ocean Salinity:

- **Evaporation and Precipitation:** Surface salinity is primarily influenced by the balance between evaporation and precipitation in a given region. Increased evaporation leads to higher salinity, while heavy precipitation dilutes seawater and lowers salinity.
- **Freshwater Inflow:** Coastal regions are influenced by freshwater input from rivers, which can significantly reduce salinity near river mouths.
- **Polar Processes:** In polar regions, freezing and thawing of ice affect salinity as ice formation excludes salt, increasing salinity, while ice melting dilutes seawater.
- **Wind Transport**: Wind can transport water from one area to another, affecting the salinity of both regions.
- **Ocean Currents:** Ocean currents redistribute water with varying salinities, contributing to regional salinity variations.
- **Temperature and Density:** Salinity, temperature, and density are interconnected; changes in temperature or density influence local salinity levels.

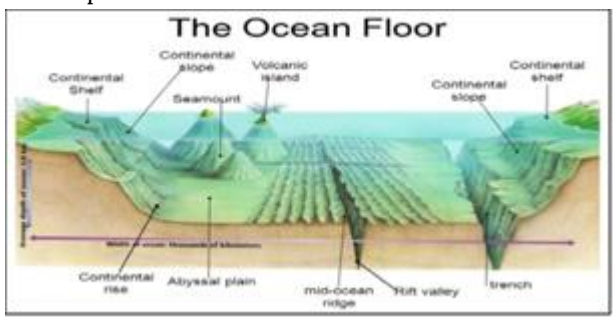
Q.12)
Ans)b
Exp) Option b is the correct answer.
When the density in the sea increases, then Salinity increases but depth decreases. When sea density increases, it's primarily due to elevated salinity. This higher salinity, caused by dissolved salts, adds mass to the water, making it denser. Denser water, 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.13)
Ans) 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.**

Important Tips Some other major oceanic landforms:

- **Continental slope:** It is a **steep drop-off** that leads from the **continental shelf to the deep ocean.** It can be up to 4 kilometers deep and is home to a variety of deep-sea creatures, such as whales, sharks, and giant squid.
- **Continental rise:** It is a **gently sloping area** that lies at the **base of the continental slope.** It is typically 2 kilometers to 4 kilometers deep and is home to a variety of deep-sea sediments.
- **Abyssal plain:** It is the **flattest and deepest part of the ocean floor**. It covers about **40% of the Earth's surface** and is typically 4 kilometers to 6 kilometers deep. The abyssal plain is home to a variety of deep-sea creatures, such as sea cucumbers, sea stars, and sea anemones.
- **Mid-ocean ridge:** It is a **continuous mountain range** that runs through the **center of all the major oceans.** It is formed by the upwelling of molten rock from the Earth's mantle. The mid-ocean ridge is home to a variety of hydrothermal vents, which are areas where hot, mineral-rich water flows out of the ocean floor. Hydrothermal vents support a diverse range of marine life, including tubeworms, clams, and crabs.

- **Ocean trench:** It is a **long, narrow depression in the ocean floor.** Ocean trenches are formed when **one tectonic plate slides underneath another**. The deepest ocean trench in the world is the Mariana Trench, which is located in the western Pacific Ocean and is over 11 kilometers deep.



Q.14)
Ans) 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.**
Important Tips Factors influencing ocean currents:

- **Solar heating:** Sun's heat warms surface water, making it less dense and causing it to rise and create currents that transport warm water away from the equator towards the poles.
- **Wind:** Wind blows surface water, generating waves and currents. Variations in wind direction and speed lead to changes in ocean currents.
- **Coriolis force:** Earth's rotation deflects moving water, causing ocean currents to curve as they travel across the Earth's surface.
- **Topography:** Ocean floor topography, like the Mid-Atlantic Ridge, can obstruct or redirect the flow of water, influencing ocean currents.
- **Salinity:** Differences in water salinity affect density, with saltier water sinking and creating currents that move from the surface to the ocean bottom.

Q.15)
Ans) c
Exp) Option c is the correct answer.
Gulf Stream flows along the western boundary of the Sargasso Sea, while the Canary Current is located further east, along the coast of northwest Africa.
Statement a is correct: The Sargasso Sea is known for its anti-cyclonic circulation, where ocean currents move in a clockwise direction.
Statement b is correct: It records the highest salinity in Atlantic Ocean.
Statement d is correct: the Sargasso Sea is located within a gyre, which is an area of calm and relatively motionless water.

Q.16)
Ans) d
Exp) Option d is the correct answer.

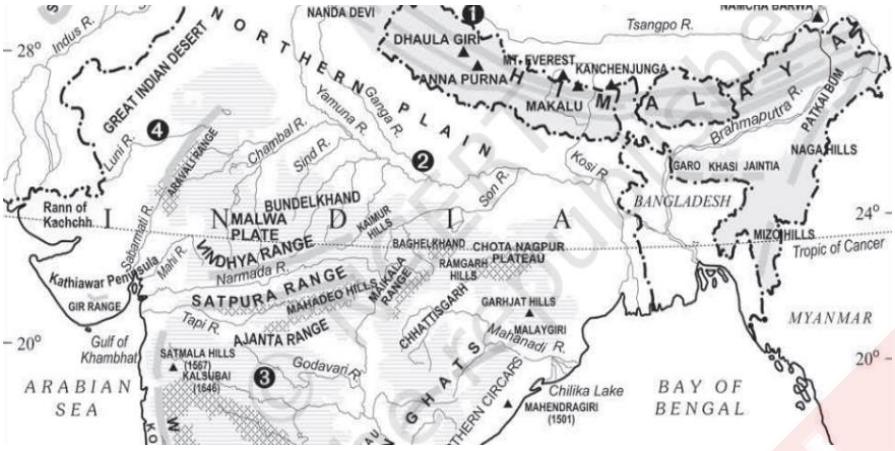
The warm water of the Gulf Stream does not sustain the coral reefs of the West Pacific Coast. Coral reefs are primarily found in **tropical and subtropical regions**, particularly in the **Indo-Pacific region**, including the **West Pacific Coast**. The Gulf Stream, on the other hand, is a **strong, warm ocean current that flows from the Gulf of Mexico along the eastern coast of the United States** and then moves across the **Atlantic Ocean towards Europe**. It plays a significant role in **shaping the weather patterns along the East coast of the USA.**

Q.17)
Ans) b
Exp) Option b is the correct answer.
The Indian states that share a land border with Bangladesh are **Assam, West Bengal, Mizoram, Meghalaya, and Tripura.**
Option 1 is incorrect: Sikkim does not share a direct land border with Bangladesh. It is situated in the northeastern part of India but does not share a boundary with Bangladesh.
Option 2 is correct: **Mizoram shares a border with Bangladesh**. It is a northeastern state of India that shares a boundary with both Myanmar and Bangladesh.
Option 3 is correct: **Assam, a state in northeastern India, shares a border with Bangladesh**. It forms a significant part of the India-Bangladesh border in the northeast.
Option 4 is correct: Meghalaya shares a border with Bangladesh. It is a northeastern state of India that shares a boundary with Bangladesh on its southern side.
Option 5 is incorrect: Nagaland does not share a direct land border with Bangladesh. It is located in the northeastern part of India but does not share a boundary with Bangladesh.

Q.18)
Ans) c
Exp) Option c is the correct answer.
The correct order of the given mountain hills from East to West is:

1) **Garhjat hills:** It is a mountain range formed by a series of low-lying hills, plateau, ridges and meadows that stretch into Odisha from the Utkal Plains in the Chota Nagpur region of Jharkhand and the Chhattisgarh Plains.
2) **Ramgarh hills:** Ramgarh Mountain is **located in Chhattisgarh,** about 60 kilometers from Ambikapur. Ramgarh is the most ancient in the historical places of Surguja.
3) **Kaimur Hills:** The Kaimur Hills, also known as the Kaimur Range, are a 300-mile (483 km) long range of hills that **stretch from Katangi in Madhya Pradesh to Sasaram in Bihar**. The hills are part of the Vindhya Range and pass through the Rewa and Mirzapur divisions.

4) **The Satmala hills** are a mountain range in the Nashik district of Maharashtra, India. The range is 1,472 meters high and is a part of the Sahyadris range. The Satmala-Chandwad Range runs east and west, forming the main divide of the plateau region.



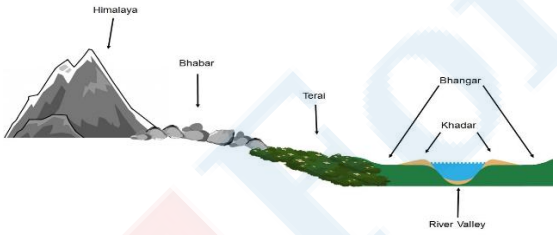
Source: Class XI - India: Physical environment Ch: 2, Pg: 10

Q.19)

Ans) d

Exp) Option d is the correct answer.

Bhabar or Bhabhar is a region located south of the Lower Himalayas and the Shivalik Hills in Kumaon, India. It is a belt of 8-16 km lying parallel to the slopes of the Shivaliks, where the rivers descending from the mountains deposit pebbles. The **streams flow through the pebbles in the region, hence disappearing from sight.** They re-emerge only after some distance south, in the relief feature Terai. It is **relatively less fertile compared to the adjacent plains.** The name Bhabar refers to a local tall-growing grass, Eulaliopsis binata, used for the manufacture of paper and ropes. The Bhabar region contains some of the largest cities of Kumaon and Garhwal: Haldwani, Ramnagar, Tanakpur, and Kotdwar.



Knowledge Base:

1) **Khadar** is the newer and fertile alluvial soil that is deposited by rivers during their periodic flooding. These deposits are rich in nutrients, making Khadar areas highly fertile and suitable for agriculture. Khadar regions are located adjacent to rivers and are renewed with fresh sediments during floods.
2) **Bhangar** comprises the older alluvial deposits found above the floodplains. These deposits are comparatively higher in elevation and are older than the Khadar. Bhangar areas are less fertile due to a lower nutrient content compared to the Khadar. They are mainly used for rain-fed agriculture and are located further away from the river channels.
3) **Tarai:** South of the Bhabar is the Tarai belt, with an approximate width of 10-20 km where most of the streams and rivers re-emerge without having any properly demarcated channel, thereby, creating marshy and swampy conditions known as the Tarai. This has a luxurious growth of natural vegetation and houses a varied wildlife.

Source: Class XI - India: Physical environment Ch: 2, Pg: 12

Q.20)

Ans) b

Exp) Option b is the correct answer.

The Western Ghats and the Eastern Ghats are two mountain ranges that run parallel to the western and eastern coasts of India, respectively.

Statement 1 is correct: The Western Ghats are **continuous and are higher in elevation than the Eastern Ghats.** The average elevation of the Western Ghats is 900–1600 meters, while the Eastern Ghats average 600 meters.

Statement 2 is incorrect: The highest peak of the Western Ghats is **Anamudi at 2,695 meters** (8,842 feet) located in the Indian state of Kerala. Kalsubai is the highest peak (1646 meters) in Maharashtra, India. It is also part of Western Ghats Mountain range.

Statement 3 is correct: The Western Ghats form one of the four watersheds of India, feeding the perennial rivers of India. The **major river systems originating in the Western Ghats are the Godavari, Kaveri, Krishna, Thamirabarani, and Tungabhadra rivers.**

1) T**he Thamirabarani or Tamraparni or Porunai is a perennial river that originates from the Agastyarkoodam peak of Pothigai hills of the Western Ghats.** It flows through Tamil Nadu state of southern India into the Gulf of Mannar.
2) **The Tungabhadra river originates in the Western Ghats, a mountain range that runs along the western coast of India**. The river has two main tributaries, the Tunga river and the Bhadra river. The Tunga river originates in the Chikmagalur district of Karnataka and the Bhadra river originates in the Western Ghats of the Shimoga district of Karnataka. The two rivers meet near Kudli, in the Shimoga district, to form the Tunga Bhadra river.

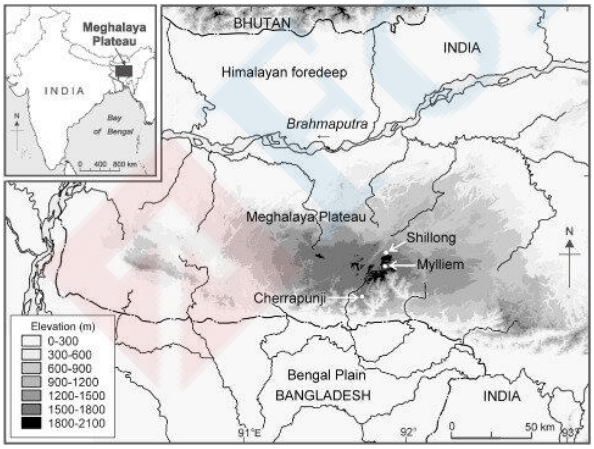
Source: Class XI - India: Physical environment Ch: 2, Pg: 13

Q.21)

Ans) b

Exp) Option b is the correct answer.

The Meghalayan plateau, situated in the northeastern region of India, is known for its unique geographical features, high rainfall, and diverse mineral resources.



Statement 1 is correct: The Meghalayan plateau is an **extension of the main Indian peninsular plateau** and was originally divided into two plateaus: the Karbi Anglong Plateau and the Meghalaya Plateau.

Statement 2 is incorrect: The Meghalaya plateau is rich in minerals such as **coal, limestone, kaolin, clay, granite, glass-sand, and uranium.** However, it is not known for fossil fuels such as natural gas and crude oil.

Statement 3 is correct: The southern part of the Meghalayan plateau is known for receiving the **highest annual rainfall in the world**. The Meghalayan plateau, particularly areas like Cherrapunji and Mawsynram in Meghalaya, have gained global recognition for receiving some of the highest annual rainfall measurements.
Source: Class XI - India: Physical environment Ch: 2, Pg: 13

Q.22)
Ans) c
Exp) Option c is the correct answer.
The coastline of India is about 7517 Km long. (6100 km of mainland coastline and around 1417 km of Indian islands.) 13 States and UTs have coastal plains in India. The Coastal States of India are Kerala, Tamil Nadu, Gujarat, West Bengal, Goa, Karnataka, Maharashtra, Andhra Pradesh, and Odisha. Daman & Diu, Puducherry, Lakshadweep Islands, and Andaman & Nicobar Islands are the coastal Union territories. The top 3 Indian States having the longest coastline:

1. Gujarat – 1215 Km,
2. Andhra Pradesh – 974Km,
3. Tamil Nadu – 907 Km..

Statement 1 is correct: The **Western coast of India is a submerging coast, while the Eastern coast is an emergent coast**. The Western coast submerges because the landmass dips along a fault line, sinking the coast. The Eastern coast rises due to sediment buildup from its numerous rivers, pushing out land into the Bay of Bengal. This contrasting movement creates both a narrow, deep western coast and a broader, shallower eastern coastline.
Statement 2 is incorrect: The width of the continental shelf varies greatly ranging between a few kilometers to more than 100 kilometers. This variation can be seen even in the context of Indian peninsula. The **continental shelf off the eastern coast of India is almost twice more than that of the western coast.**
Statement 3 is correct: The Western coast of India is more suitable for ports compared to the Eastern coast due to its greater indentation and suitability for ports**.**
Statement 4 is correct: The Western coast of India is characterized by a rocky coastline and is narrower than the Eastern coast. The Western coast is also home to short and fast-flowing rivers, which do not result in delta formation. In contrast, the Eastern coast of India is broader and has a gentler slope. The east-flowing rivers on the Eastern coast flow with low velocities and deposit the sediments brought with them at the coast, resulting in the formation of deltas. Therefore, the **Eastern coast of India has more extensive deltas compared to the Western coast**
Source: Class XI - India: Physical environment Ch: 2, Pg: 14

Q.23)
Ans) b
Exp) Option b is the correct answer.
The **Ten Degree Channel** is a channel that separates the A**ndaman Islands and Nicobar Islands from each other in the Bay of Bengal.** It is approximately 150 km wide from north to south and 10 km long from east to west. The channel is named so because it lies on the 10-degree line of Latitude, north of the equator.

Knowledge Base:

1) The Minicoy Island and Maldives are separated by the Eight Degree Channel
2) The Nine Degree Channel is a channel in the Indian Ocean between the Laccadive Islands of Kalpeni and Suheli Par, and Maliku Atoll (Minicoy Island).
3) The island of Minicoy is separated from the main Lakshadweep archipelago by the Nine Degree Channel.

Source: Class XI - India: Physical environment Ch: 2, Pg: 15

Q.24)

Ans) b

Exp) Option b is the correct answer.

The drainage area of India is divided into two parts based on the direction of flow of water: the Arabian Sea drainage and the Bay of Bengal drainage.

Statement I is correct: Nearly **77% of the drainage area consisting of the Ganga, the Brahmaputra, the Mahanadi, the Krishna, etc. is oriented towards the Bay of Bengal** while 23% comprising the Indus, the Narmada, the Tapi, the Mahi and the Periyar systems discharge their waters in the Arabian Sea.

Statement II is correct but Statement-II is not the correct explanation for Statement-I: The Bay of Bengal drainage basin receives significant rainfall from two primary monsoons: the South-west monsoon and the northeast monsoon. The South-west monsoon, which occurs between June and September, is the primary source of rainfall for most of India, including the Bay of Bengal drainage basin. The North-east monsoon, which occurs between October and December, is a secondary source of rainfall for the region. However, Statement II does not explain why most of the drainage area is oriented towards the Bay of Bengal. The **gradient or slope of the land in northern and eastern India generally tilts towards the southeast**, favoring the flow of water towards the Bay of Bengal. Hence majority of Indian rivers drain their water into Bay of Bengal.

Source: Class XI - India: Physical environment Ch: 3, Pg: 19

Q.25)

Ans) a

Exp) Option a is the correct answer.

Tropical evergreen forests are **dense, multi-layered forests** that contain many types of **plants and animals.** They are found in areas that receive **heavy rainfall (more than 200 cm annual rainfall).** The trees in these forests **do not shed their leaves** and **they always appear to be green**.

Option 1 is incorrect- Teak (Tectona grandis) wood trees thrive in **tropical deciduous forests**, exhibiting **moderate hardness, durability, and fire resistance**. This wood can be readily seasoned and shaped,

acquiring a **smooth polish**, and **remains unharmed by white ants**. Globally recognized as one of the most valuable timber trees, teak stands out for its versatile qualities and resilience.

Option 2 is incorrect- The **Babul tree species (Vachellia nilotica)** is commonly located in **thorn forests**, alternatively referred to as **dry forests or tropical savannas**. Thorn forests are distinguished by a **sparse tree population, scrubby vegetation, and elongated thorns on the plants**. Typically situated in arid areas with low rainfall and elevated temperatures, such as regions in **India, Africa, and Australia.**

Option 3 is incorrect- The **Neem tree (Azadirachta indica)** is a versatile and resilient species found in dry deciduous and thorn forests. Neem trees are widely distributed throughout **tropical and subtropical regions**, including **India, Africa, and Southeast Asia**. They play a vital role in the ecology of tropical thorn forests and are also valued for their **medicinal and economic properties.**

Option 4 is correct- Rosewood (Dalbergia sissoo) is found in **tropical evergreen forests**. Rosewood isn't a single species, but rather a **group of trees** belonging primarily to the **genus Dalbergia**. These trees are native to various tropical and subtropical regions, including **South America, Africa, India, and Southeast Asia**. Each region boasts its **unique rosewood varieties**, distinguished by subtle differences in **color, grain pattern, and density**. Indian Rosewood, also known as **Sheesham**, offers a vibrant **reddish-brown hue** and **exceptional strength**. It's a popular choice for **furniture and decorative items**.

Option 5 is correct- Thuja occidentalis, commonly known as **northern white-cedar**, **eastern white-cedar, or arborvitae**, usually found in **tropical evergreen forests** belonging to the **cypress family (Cupressaceae)**. Native to **eastern Canada and extensive regions of the north-central and northeastern United States**, it is extensively grown as ingredient of homeopathy.

Source: Class XI – India: Physical environment Ch: 5, Pg: 42

Q.26)

Ans) d

Exp) Option d is the correct answer.

Social forestry involves the **administration and preservation of forests**, along with **afforestation on unproductive lands,** aiming to contribute to **environmental, social, and rural development.** The **National Commission on Agriculture (1976)** has categorized social forestry into three distinct types: **Urban forestry, Rural forestry, and Farm forestry.**

Option a is incorrect- Urban forestry involves the **cultivation and administration** of trees on both **public and private lands** situated in and around **urban centers**, including areas like **green belts, parks, roadside avenues, and industrial and commercial green belts**.

Option b is incorrect- Agro-forestry involves **cultivating trees and agricultural crops on the same piece of land,** encompassing **even the unused patches.** This practice integrates forestry with agriculture, thereby modifying the concurrent production of **food, fodder, fuel, timber, and fruit.**

Option c is incorrect- Community forestry encompasses the cultivation of trees on **community land or public land**, including areas like **village pastures, temple land, roadways, canal banks, strips along railway lines, and schools.** The community forestry program is designed to offer benefits to the **entire community**, providing a platform for individuals from **landless classes to engage in tree cultivation**. This allows them to access benefits that are typically limited to landowners.

Option d is correct- Farm forestry refers to the practice wherein **farmers cultivate trees on their farmlands for both commercial and non-commercial purposes**. State forest departments often provide **free tree seedlings to small and medium-sized farmers.** Areas like the **peripheries of agricultural fields, grasslands, pastures, and spaces around homes and cowsheds** are suitable for cultivating trees as part of non-commercial farm forestry.

Source: Class XI – India: Physical environment Ch: 5, Pg: 47

Q.27)
Ans) a
Exp) Option a is the correct answer.
The Ganga holds the utmost significance in India in terms of its basin and cultural importance. Originating near **Gaumukh (3,900 m)** in the **Uttarkashi district of Uttarakhand** from the **Gangotri glacier,** it is known as the **Bhagirathi** at this point. Significant tributaries, including the **Ramganga, Gomati, Ghaghara, Gandak, Kosi, and Mahanada**, contribute to the Ganga's flow. The river ultimately empties into the **Bay of Bengal near Sagar Island.**
Option 1 is incorrect- Comprising the **Kaligandak and Trishulganga streams**, the **Gangdak river** system originates between **Dhaulagiri and Mount Everest** in the **Nepal Himalayas**, gradually **ascending and draining** the central region of the country. As it flows into **Bihar's Champaran district,** it enters the **Ganga plain** and eventually converges with the Ganga at **Sonpur, near Patna**.
Option 2 is incorrect- Originating from the **Mapchachungo glaciers (Tibet)**, the **Ghagra river** is formed by the confluence of its tributaries—**the Tila, Seti, and Beri. Emerging near Shishapani**, it carves a **wide gorge.** As it progresses, the **Sarda River (also known as Kali or Kali Ganga)** joins it on the plains before the river eventually merges with the **Ganga** at **Chhapra in Bihar.**
Option 3 is correct- Chambal originates at Janapav, south of Mhow town, on the south slope of the Vindhya Range in Madhya Pradesh. The Chambal River courses through a canyon to the **north of Kota, Rajasthan**, where the **Gandhisagar dam** is situated, before ascending near **Mhow on the Madhya Pradesh Malwa plateau**. Progressing through **Bundi, Sawai Madhopur, and Dholpur from Kota**, it ultimately converges with the **Yamuna**. Renowned for the Chambal ravines, an integral feature of the **badlands landscape**, the Chambal River has a notable presence in the region.
Option 4 is incorrect- The primary stream of the **river Kosi**, known as the **Arun**, commences its journey in Tibet to the **north of Mount Everest**. The **Son Kosi**, originating from the west, and the **Tamur Kosi**, emerging from the **east,** merge with it after traversing **Nepal's Central Himalayas**. Upon joining forces with the river Arun, they collectively form the **Sapt Kosi.**
Option 5 is correct- Originating in the **Garhwal mountains** near **Gairsain (Uttarakhand), Ramganga** river alters its course **southwestward** after traversing the **Shiwalik**. Entering the plains of **Uttar Pradesh near Najibabad**, it ultimately meets the **Ganga** in the vicinity of **Kannauj.**
Source: Class XI - India: Physical environment Ch: 3, Pg: 22

Q.28)
Ans) b
Exp) Option b is the correct answer.
The Himalayan River system is made up of the **Indus, Ganga, and Brahmaputra rivers,** along with their tributaries. These rivers are **perennial,** meaning **they have water throughout the year.** They are also **long, have well-developed deltas, and carry large amounts of silt and sand**.
Statement 1 is incorrect- Himalayan rivers are **young** and **have not fully matured their courses**. They have **steep gradients and high sediment loads**, leading to **rapid erosion and frequent changes** in their course. This makes their flow **dynamic and unpredictable,** unlike mature rivers with well-defined, fixed channels.
Statement 2 is incorrect- While less pronounced due to the steep gradient, Himalayan rivers can still exhibit **some degree of meandering**. As water flows, it **erodes the outer banks of bends,** causing the river to **gradually curve and form loops**. However, the **high velocity and sediment load** restrict the **extent of meandering compared to rivers in flatter areas. For example, the main meandering rivers, viz. Ganga,**

Yamuna and Ghagra, originating in the Himalayas have been wrecking land masses and exacerbating the yearly menace of flood in the Indo-Gangetic Plain.

Statement 3 is correct- A**s Himalayan rivers reach the plains**, their **flow slows down significantly due to the decrease in gradient.** This allows the **deposition of sediment carried by the rivers**, forming **fertile deltas at their mouths.** The **Indus, Ganga, and Brahmaputra rivers** are all known for their **extensive deltas** formed over millennia.

Statement 4 is correct- The **Himalayan River system like Ganga forms the ox-bow lake**. The **Ganga has moved in a southward direction** within the **Indo-Gangetic plains**, resulting in the formation of **multiple oxbow lakes** to the north of the present Ganga channel. Oxbow lakes, alternatively referred to as **cutoff lakes, loop lakes, or horseshoe lakes**, are bodies of water created by the **U-shaped or curved bends** in rivers that become **isolated from the main river flow**. These formations occur when a segment of the river becomes separated from its primary channel due to the combined effects of **deposition and erosion at meandering sections**.

Source: Class XI - India: Physical environment Ch: 3, Pg: 19
https://timesofindia.indiatimes.com/city/lucknow/ganga-yamuna-meandering-marauders/articleshow/664940.cms

Q.29)
Ans) a
Exp) Option a is the correct answer.

Tropical deciduous forests, also known as **monsoon forests**, are found in regions with **heavy rainfall and a dry season.** They are **dense and lush during the wet season but** become **dry and leafless during the dry season.**

Statement 1 is incorrect - The **tropical dry deciduous forest** thrives throughout the **northern parts of the country**, **excluding the northeast**, and extends its presence into **Madhya Pradesh, Gujarat, Andhra Pradesh, Karnataka, and Tamil Nadu.** The distribution is notably correlated with regions experiencing a moderate to substantial annual rainfall ranging between **70 to 100 cm**. On the other hand, **Thorn forests occur in the areas that receive annual rainfall less than 50cm.**

Statement 2 is correct- At the onset of the dry season, the trees in the tropical dry deciduous forest undergo complete leaf shedding, transforming the forest into a vast grassland with bare trees dotting the landscape.

Statement 3 is incorrect- Mahogany and Ebony species are found in **tropical evergreen forests.** On the other hand, **Tendu, palas, amaltas, bel, khair, axlewood, etc** are prevalent in the **tropical dry deciduous forests.**

Source: Class XI - India: Physical environment Ch: 5, Pg: 44

Q.30)
Ans) d
Exp) Option d is the correct answer.

The Godavari is the largest Peninsular River system. It is also called the Dakshin Ganga. Godavari River rises from Trimbakeshwar near Nasik in Maharashtra and flows for a length of about 1465 km before draining into the Bay of Bengal.

Salient Features of Godavari Basin		
Basin Extent Longitude Latitude	 73° 24' to 83° 4' E 16° 19' to 22° 34' N	
Total drainage area of the Basin	3,12,812 Sq.km	
State	Area in Sq.km	Percentage (%)
Maharashtra	152,199	48.66
Telangana	62,150	19.87
Andhra Pradesh	11,048	3.53
Chhattisgarh	33,434	10.69
Madhya Pradesh	31,821	10.17
Odisha	17,752	5.67
Karnataka	4,405	1.41
Puducherry	3	0.001

A river is a flowing watercourse, while a river basin is the entire land area drained **by a river and its tributaries**, including the main river and its watershed.

Option d is correct: Godavari's River basin is spread over an area of 3.128 lakh sq. km. Godavari River basin is mainly spread across **Maharashtra (49%)**, **Telangana (19.9%), Madhya Pradesh** (10%), **Chhattisgarh** (10%) and **Andhra Pradesh (3.5%).** Apart from them small portions of the river basin spread across the states of Odisha and Karnataka.

Source: Class XI Indian Physical Geography - Chapter: Drainage System

Q.31)

Ans) b

Exp) Option b is the correct answer.

Mangroves are salt-tolerant plants adapted to survive in intertidal zones with high salinity levels.

They possess specialised features like specialised roots, glands, and metabolic processes to regulate salt uptake and excretion.

Statement 1 is incorrect: Many mangroves can grow in fresh water. However, they do not develop in strictly freshwater habitats because of competition from freshwater species. Salinity is thus important in eliminating other vascular plant species that are not adapted for growth in a saline habitat.

Statement 2 is correct: Mangroves are also known to absorb and store large amounts of carbon dioxide from the atmosphere. Mangroves are considered significant carbon sinks. They absorb large amounts of carbon dioxide from the atmosphere through photosynthesis and store it in their biomass and sediments. This plays a crucial role in mitigating climate change.

Statement 3 is correct: Mangroves can play an important role in reducing heavy metal pollution in water by taking up and storing heavy metal. Their **roots and sediments have the ability to absorb and accumulate certain heavy metals**, thus playing a crucial role in filtering heavy metal pollution from water. For example, in a recent research scientists found that Rhizophora stylosa (a mangrove species) absorbed high amounts of cadmium (Cd) in Yingluo Bay (China).

Source: Class XI Indian Physical Geography -Chapter: Natural Vegetation

http://mangrove.irwantoshut.com/mangrove_definition.

https://indianexpress.com/article/express-sunday-eye/down-in-jungleland-against-the-rising-tide-5869882/

Q.32)
Ans) b
Exp) Option b is the correct answer.
A wetland is a distinct ecosystem where the **land is saturated or flooded with water, either permanently or seasonally**. This water can be fresh, saltwater, or a mix of both.
Pair 1 is incorrect: Keoladeo Ghana National Park is a **man made wetland** located in the Bharatpur district of Rajasthan. The wetland receives its **primary water supply from the Gambhir and Banganga rivers** (not Chambal river) which are held back on cultivated land through the use of an artificial dam known as Ajan Bund.
Pair 2 is incorrect: Ropar is a human made wetland located in modern day Punjab. It was formed in 1952 by the construction of a barrage for diversion of **water from the Sutlej River (not Beas) f**or drinking and irrigation supplies. The site is an important breeding place for the nationally protected Smooth Indian Otter, Hog Deer, Sambar, and several reptiles, and the endangered Indian Pangolin (Manis crassicaudata) is thought to be present here.
Pair 3 is correct: Wular Lake is the 2nd largest fresh-water lake of Asia (first being Lake Baikal in Russia), situated on the foothills of Harmukh Mountain. The main source of water for **Wular Lake is River Jhelum.** Wular Lake is also said to be a remnant of Satisar Lake that existed in ancient times.
Pair 4 is correct: Chilika lake is located in the modern-day Odisha. **The main source of water for Chilika lake is Daya River** which forms the lake at its Bay of Bengal estuary. It is home to nearly 160 species of migratory birds in winter. In 1981, Chilika Lake was designated the **first Indian wetland of international importance under the Ramsar Convention.**
Source:https://rsis.ramsar.org/ris/1161
https://baramulla.nic.in/tourist-place/wular-lake/
http://daringbadi.com/sightseeing/chilika-lake/#:~:text=Located%20at%20the%20confluence%20of,importance%20under%20the%20Ramsar%20Convention

Q.33)
Ans) d
Exp) Option d is the correct answer.
Medicinal plants refer to a variety of plants used for medicinal purposes and also it may be used as a component for producing modern drugs.
Pair 1 is correct: Kachnars are used to **cure asthma and ulcers**. The buds and roots are good for digestive problems.
Pair 2 is correct: Arjun is used to treat earache. The fresh juice of leaves is a cure for earache. It is also used to regulate blood pressure.
Pair 3 is correct: Sarpagandha is laden with alkaloids, which hold strong sedative traits that positively influence an agitated brain, mind and central nervous system. **It is hence a very useful therapy for insomnia, as it pacifies the mind and promotes deep sleep at night.** Moreover, it lowers mental stress and tension, thus tackling bouts of anxiety, nervousness, panic attacks and soothing the brain and mind for peaceful sleep.
Pair 4 is correct: Himalayan fritillary is a herb and is used for the treatment of **pneumonia**. The plant is also a strong cough suppressant and a source of expectorant drugs (used to lubricate human's airway) in traditional Chinese medicine.
Knowledge Base:

Sarpagandha	: Used to treat blood pressure; it is found only in India.
Jamun	: The juice from ripe fruit is used to prepare vinegar which is carminative and diuretic, and has digestive properties. The powder of the seed is used for controlling diabetes.
Arjun	: The fresh juice of leaves is a cure for earache. It is also used to regulate blood pressure.
Babool	: Leaves are used as a cure for eye sores. Its gum is used as a tonic.
Neem	: Has high antibiotic and antibacterial properties.
Tulsi Plant	: Is used to cure cough and cold.
Kachnar	: Is used to cure asthma and ulcers. The buds and roots are good for digestive problems.

Identify more medicinal plants in your area. Which plants are used as medicines by local people to cure some diseases?

Source : Medicinal Plants by Dr. S.K. Jain, 5th edition 1994, National Book Trust of India

Source: Class IX – Contemporary India- Chapter: Natural Vegetation
https://www.thehindu.com/sci-tech/energy-and-environment/three-himalayan-medicinal-plants-enter-iucn-red-list/article66243601.ece#:~:text=bronchial%20disorders%20and-,pneumonia,-.%20The%20plant%20is

Q.34)
Ans) c
Exp) Option c is the correct answer.
On the basis of genesis, colour, composition and location, the soils of India have been classified into Black soils, Alluvial soils, Red and Yellow soils, Laterite soils etc.
Statement 1 is correct: The black soils are generally clayey, deep and impermeable. They swell and become sticky when wet and shrink when dried. Because of its character of slow absorption and loss of moisture, **the black soil retains the moisture for a very long time,** which helps the crops, especially, the rain-fed ones, to sustain even during the dry season.
Statement 2 is correct: Black soil's **high fertility and moisture retention** favour the growth of various crops, **including cotton, sugarcane, jowar, and tobacco.** These crops require a rich soil with good water availability, which black soil provides.
Statement 3 is correct: It is true that **Black soil is prone to erosion which necessitates careful management practices**. **Mulching** helps retain moisture and prevent soil erosion by wind and water, while **contour bunding** creates ridges on the landscape that slow down water flow and minimise soil loss.

Contour bunding; Mulching
Statement 4 is incorrect: While some black soils can be found in the northern parts of the Satpura range, its distribution is not restricted to this area. Black soil patches cover the Deccan Plateau region, encompassing parts of **Gujarat, Madhya Pradesh which lies to the north** of Satpura range. It is also found in **Southern parts of Satpura ranges such as Maharashtra, Karnataka, Telangana and Tamil Nadu.**
Source: Class XI Indian Physical Geography -Chapter: Soils

Q.35)
Ans) d
Exp) Option d is the correct answer.
Laterite soils exhibit deficiencies in organic matter, nitrogen, phosphate, and calcium, while possessing an excess of iron oxide and potash. Consequently, these soils are deemed unsuitable for cultivation.

However, the application of manures and fertilisers will enhance the soil fertility for agricultural purposes.

Statement-I is incorrect: Laterite soils are indeed rich in iron oxide. The intense weathering process responsible for their formation concentrates iron oxides and aluminium oxides in the soil, giving them their characteristic **reddish-brown colour.** However, laterite soils are also typically **deficient in organic matter and humus content** due to the leaching process that removes these components.

Statement-II is correct: Laterite soils are primarily formed in regions with high rainfall and high temperatures. The **intense heat and abundant rainfall** accelerate the process of chemical weathering, leading to the **leaching of soluble elements like silica and calcium, while leaving behind iron and aluminium oxides**. Further, **humus content of the soil is removed fast by bacteria that thrives well in high temperatures**.

Source: Class XI Indian Physical Geography -Chapter: Soils

Q.36)

Ans) b

Exp) Option b is the correct answer.

Water is essential for agricultural purposes and cultivating crops. Yet, excessive water usage and unsustainable land practices have caused severe soil leaching through water and wind, ultimately degrading soil quality and hastening land desertification. In this scenario, some of the following methods can be utilised effectively to prevent soil erosion:

Option 1 is correct: Grassed waterways are **strips of grass planted along slopes and natural drainage paths**. They effectively prevent soil erosion by **slowing down water flow, trapping sediment and promoting water infiltration** into the soil, thus reducing runoff and soil erosion.

Option 2 is correct: Cover crops provide a protective layer that shields the soil from the impact of water-holding. Additionally it adds organic matter to the soil, which **improves soil structure and water-holding capacity.** Furthermore, by improving soil **fertility** and **reducing the need for chemical fertilisers, which** will go a long way in preventing soil erosion.

Option 3 is incorrect: Tillage exposes more soil particles to wind and water erosion.

Further, tillage accelerates the decomposition of organic matter and reduces soil structure, thereby accelerating the process of soil erosion. Thus, **No-tillage (not the intensive tillage) farming** is an effective way to prevent soil erosion.

Option 4 is incorrect: Monocropping is the practice of growing the same crop year after year, which can **deplete soil nutrients** and organic matter, **making it more susceptible to erosion.** Further, continuous planting of the same crop depletes specific nutrients from the soil, **weakening plant growth and reducing its ability to protect the soil.**

Source: Class XI Indian Physical Geography -Chapter: Soils

https://vikaspedia.in/agriculture/best-practices/sustainable-agriculture/crop-management/201czero-tillage201d-zero-worries

https://timesofindia.indiatimes.com/blogs/voices/water-usage-in-agriculture-how-it-can-be-managed/#:~:text=downstream%20flood%20risks.-,Crop,-Rotation%20imparts%20numerous

Q.37)

Ans) a

Exp) Option a is the correct answer.

The Brahmaputra River, also known as Yarlung Tsangpo in its upper reaches. It originates from the Chemyungdung glacier in Kailash Ranges of Himalayas in the Tibetan Plateau of China. It flows for over 2,900 km **through Tibet, India, and Bangladesh** before emptying into the Bay of Bengal.

Statement 1 is incorrect: The **Brahmaputra River originates from Mansarovar Lake near Chemayungdung glacier of the Kailash range, not Rakshastal Lake** (source of the Sutlej River). Both lakes are located near the Kailash range in the Tibetan.

Statement 2 is correct: The Brahmaputra River is known for its braided channels, which are formed by the deposition of sediments and the shifting of the river's course over time. These braided channels create a complex network of interconnected islands. The **world's largest riverine island, Majuli is located on the Brahmaputra River in Northeastern Assam.**

Statement 3 is incorrect: The **Dibang and Lohit rivers join the Brahmaputra after it enters India, not before.** These are major left bank tributaries of the Brahmaputra River system, contributing significantly to its flow and sediment load.

Source: Class XI Indian Physical Geography- Chapter: Drainage System

Q.38)

Ans) d

Exp) Option d is the correct answer.

The presence of nitrogen in soils is crucial for plant growth and development, playing a vital role in several key processes. However, most of the soils lack nitrogen content naturally and some of them are given below:

Option 1 is correct: Arid soils range from red to brown colour. They are generally sandy in structure and saline in nature. Due to the dry climate, high temperature and accelerated
evaporation, they lack moisture and humus. They also **lack Nitrogen and the phosphate content is normal.**

Option 2 is correct: Black soil is renowned for its **high content of lime, iron, magnesia and alumina.** They also contain **potash**. But t**hey lack phosphorus,nitrogen and organic matter.** Black soil covers most of the Deccan Plateau which includes parts of Maharashtra, Madhya Pradesh, Gujarat, Andhra Pradesh and some parts of Tamil Nadu.

Option 3 is correct: Laterite soils are poor in organic matter, nitrogen, phosphate and calcium, while iron oxide and potash are in excess due to intense leaching in its hot and humid conditions.

Option 4 is correct: Red soil develops on crystalline igneous rocks in areas of low rainfall in the eastern and southern part of the Deccan Plateau. The soil develops a **reddish colour** due to a wide diffusion of iron in crystalline and metamorphic rocks. They are **generally poor in nitrogen, phosphorus and humus.**

Source: Class XI Indian Physical Geography- Chapter: Soils

Q.39)

Ans) c

Exp) Option c is the correct answer.

Peaty soils are formed through the accumulation of **partially decomposed organic matter** in waterlogged environments with limited oxygen availability. It occurs widely in the northern part of Bihar, southern part of Uttaranchal and the coastal areas of West Bengal, Orissa and Tamil Nadu.

Statement 1 is correct: Peaty soils are found mainly in the areas of high temperature and high humidity, which facilitates the **accumulation of organic matter** due to the slow decomposition of plant material in waterlogged conditions.
Statement 2 is correct: Peaty soils are indeed rich in humus and organic content (40-50% of the soil). This is because they are formed from the decomposition of organic matter in waterlogged environments with **limited oxygen, hindering complete decomposition**. This leads to the accumulation of partially decomposed organic matter, known as peat, which gives the soil its characteristic dark colour and high organic content.
Source: Class XI Indian Physical Geography- Chapter: Soils

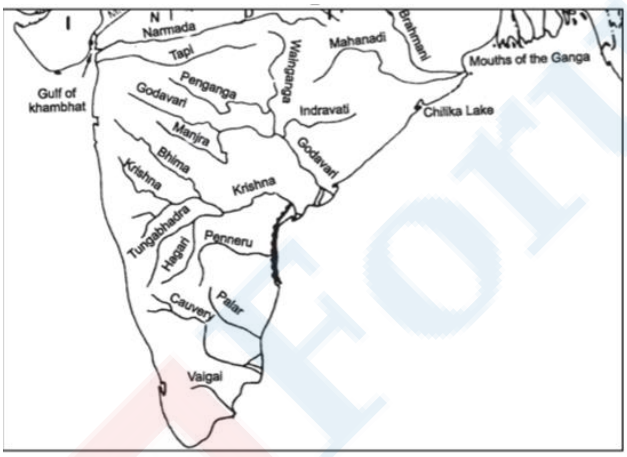
Q.40)
Ans) d
Exp) Option d is the correct answer.
The Cauvery River originates from the **Brahmagiri hills** at an elevation of 1,341 metres in the **Kogadu district of Karnataka** encompassing a drainage area of 81,155 square kilometres. The Cauvery basin extends across regions, with approximately **3 percent falling within Kerala, 41 percent in Karnataka, and 56 percent in Tamil Nadu**. Noteworthy tributaries contributing to its flow include the **Kabini, Bhavani, and Amravati rivers.**
Option d is correct: The Cauvery's catchment area receives rainfall from both the **Southwest monsoon (June-September) and the Northeast monsoon (October-December).** This ensures a continuous supply of water throughout the year, reducing the fluctuations in its flow compared **to other Peninsular rivers that only receive rainfall from one monsoon**.
Option a,b and c are incorrect: Like other Peninsular rivers the Cauvery River too has a **substantial number of human-made changes such as dams.** Additionally, the Cauvery River has a length of approximately **800 kilometres, which is not particularly short** compared to other Peninsular rivers. Furthermore, like other peninsular rivers, **Cauvery River too has an extensive network of non-perennial tributaries**.
Source: Class XI Indian Physical Geography- Chapter: Drainage System

Q.41)
Ans) b
Exp) Option b is the correct answer.
Option 1 is correct: T**he Sabarmati River originates in the Aravalli Hills of Gujarat**, in Udaipur district. From its source, it flows **south-westwards** for a total length of 371 kilometres before **emptying into the Gulf of Khambhat, which is part of the Arabian Sea.**

Option 2 is correct: T**he Periyar river with 244 km in length is the longest river of Kerala a**nd drains an area of 5,398 sq km. It rises at the forest land Sivagiri peak 80 km **South of Devikulam, town in Idukki district,** at an elevation of 2,438m. The **river flows Westwards,** and, in its course, it is joined various tributaries.

Option 3 is correct: The **Mahi River,** originates on the Northern slope of Vindhyas in **Madhya Pradesh. It has a total length of 583 km and it traverses through the states of Madhya Pradesh, Rajasthan and Gujarat.** In **Gujarat it eventually empties into the Arabian Sea.**

Option 4 is incorrect: Mahanadi River originates from Amarkantak Plateau, **Chhattisgarh**, near the temple complex of Amarkantak. It flows **east and southeast towards the Bay of Bengal.**



Option 5 is incorrect: The Pennar River, a significant **eastward-flowing rive**r in southern India, **originates from the Chenna Kasava hill in Karnataka's Nandidurg range in Chikkaballapura district**. It flows through the Kolar and Tumkur districts of Karnataka before crossing into Andhra Pradesh at the Anantapur district. Upon entering Andhra Pradesh, it flows eastward and eventually empties into the Bay of Bengal near Nellore.

Source: Class XI Indian Physical Geography- Chapter: Drainage System

Q.42)

Ans) a

Exp) Option a is the correct answer.

The **Himalayan ranges** exhibit a progression of vegetation from **tropical to tundra**, v**arying with altitude**. When examining the vegetational zones, the **eastern Himalayas share similarities with the western**

Himalayas. However, as a whole, the **eastern Himalayas feature more tropical elements**, a diverse range of **Oaks and Rhododendrons**, and **fewer conifers** compared to the western Himalayas.

Option a is correct - Warmer temperatures, higher precipitation, and lower altitudes provide conditions more conducive to plant growth, including:

1) Increased potential for plant metabolism and photosynthesis due to higher temperatures.
2) Longer growing season due to milder winters.
3) Reduced stress on plants due to less harsh environmental conditions.

Option b is incorrect- While **wind can play a role in seed dispersal**, it's not the primary reason for thicker vegetation on the southern slopes. In fact, the southern slopes generally experience **less wind than the northern slopes**. Additionally, **strong winds can potentially damage plants and hinder their growth.**

Option c is incorrect- The **monsoon winds primarily deposit their rain on the windward side, which is the southern slopes of the Himalayas**. The northern slopes experience the **"rain shadow" effect**, receiving significantly **less rainfall,** which contributes to less vegetation.

Option d is incorrect- While **steeper slopes can improve drainage**, there's **no strong evidence to suggest a significant difference in slope angle between the northern and southern slopes.** Additionally, **while waterlogging can be harmful to plants**, it's not a major factor influencing the vegetation cover on the Himalayas.

Source: Class XI - India: Physical environment Ch: 5, Pg: 45

Q.43)

Ans) c

Exp) Option c is the correct answer.

The combination of prevailing winds, ocean currents, rain shadow effect, high-pressure belts, and subsidence creates a favourable environment for desert formation in the western margins of continents in the subtropics.

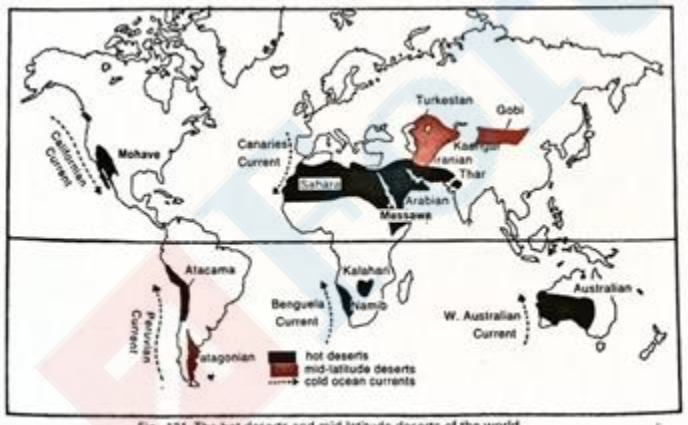


Fig. 131 The hot deserts and mid-latitude deserts of the world

Statement 1 is correct: As air from the equator moves towards the subtropics, **it subsides and the air becomes dry and warm.** This leads to a condition **least favourable for precipitation** of any kind to take place and contributes to **aridity**.

Statement 2 is incorrect: The trade winds known as the **easterlies, are the dominant wind systems in the subtropics**. These winds **blow from east to west (not west to east)** carrying **moisture from the oceans towards the continents.** As the winds move inland, they **lose moisture** through precipitation and become drier. By the time they reach the western margins of continents, they have become very dry, creating arid conditions favourable for desert formation.

Statement 3 is correct: The presence of Cold ocean currents along the western coast cools the air above them, reducing its capacity to hold moisture and hindering precipitation. This phenomenon contributes to the aridity of the western margins of continents. For example the cold **Canary Current off the coast of Africa associated with the formation of the Sahara deserts.**

Statement 4 is correct: Mountain ranges running parallel to the West coasts can create a rain shadow effect. This occurs when the mountains block the moisture-laden winds, causing them to lose their moisture on the windward side and creating **drier conditions on the leeward side.**

For example the **Andes Mountains in South America lead to the formation of the Atacama desert.**

Source: Class IX NCERT - Chapter: Climate

G C Leong - Chapter 18: The Hot Desert and Mid-Latitude Desert Climates

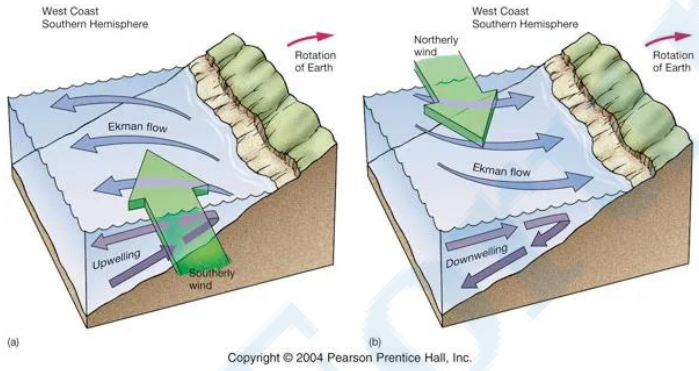
Q.44)

Ans) b

Exp) Option b is the correct answer.

Coastal upwelling is an oceanographic phenomenon that involves the **upward movement of nutrient-rich deep waters towards the ocean's surface**, providing a vital source of sustenance for a diverse array of marine life.

Statement 1 is incorrect: Coastal upwelling **facilitates the movement of nutrient-rich deep water to the surface,** fostering an environment **conducive to the growth of phytoplankton, seaweed, and other primary producers**. These primary producers form the foundation of the marine food web, supporting the growth of zooplankton and other marine organisms.



Statement 2 is correct: Nutrient-rich waters resulting from coastal upwelling **create highly productive fishing grounds.** The increased availability of food resources supports a thriving community of fish, marine mammals, and birds. This phenomenon is exemplified by regions like the **west coast of Peru**, where continual coastal upwelling contributes to one of the richest fishing grounds globally. Overall, **coastal upwelling regions only cover 1 percent of the total area of the world's oceans, but they provide about 50 percent of the fish harvests**.

Source: https://education.nationalgeographic.org/resource/upwelling/

Q.45)

Ans) d

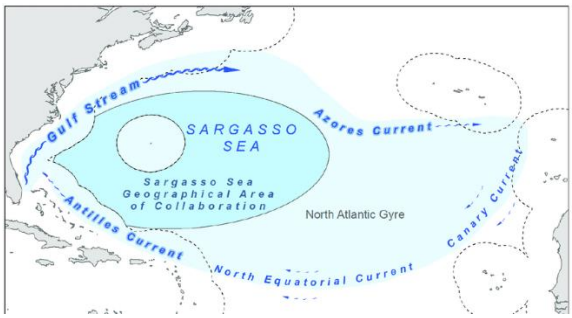
Exp) Option d is the correct answer.

Oceanic gyres are expansive systems of circulating ocean currents that play a crucial role in the global movement of seawater. These large-scale gyres are characterized by their circular or spiral patterns, **influencing the distribution of heat, nutrients, and marine life across the world's oceans.**

Statement 1 is incorrect: In the **Northern Hemisphere, these currents move in a clockwise direction,** while **in the Southern Hemisphere, they circulate counterclockwise. This** rotation is a result of the **Coriolis effect**, a phenomenon caused by the Earth's rotation.

Statement 2 is incorrect: The oceanic gyres are not typically considered the most productive regions of the ocean. **The central areas of gyres tend to have lower nutrient concentrations, limiting primary productivity.** However, the outer edges of gyres, where upwelling occurs, can be rich in nutrients, supporting diverse marine life.

Statement 3 is incorrect: The Sargasso Sea, often associated with oceanic gyres, is located in the **North Atlantic Ocean**. It is characterized by its calm waters. It is enclosed on the west by the **Gulf Stream**, on the north by the **North Atlantic Drift**, on the east by the **Canary Current**, and on the south by the **North Atlantic Equatorial Current.**



Sargasso Sea

Source: https://education.nationalgeographic.org/resource/ocean-gyre/

Q.46)

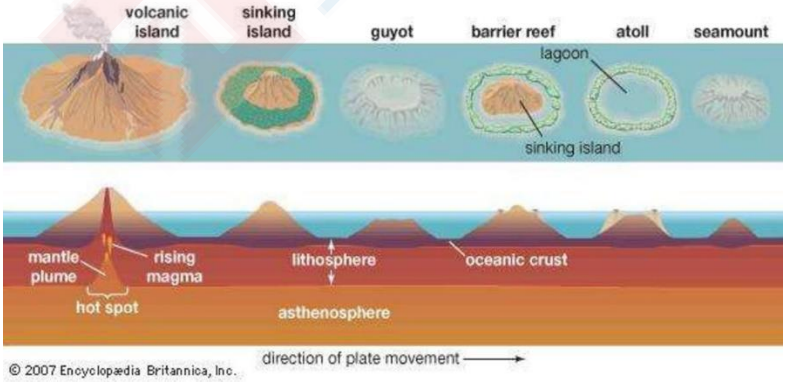
Ans) c

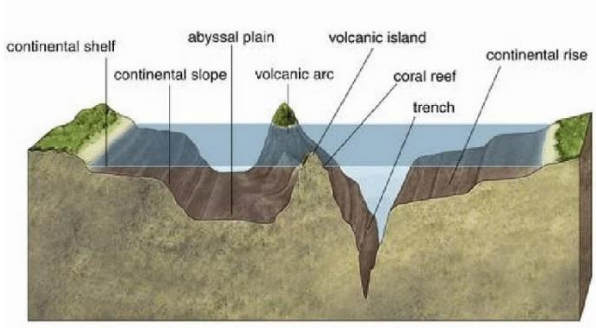
Exp) Option c is the correct answer.

A guyot, **also known as a table mount or flat-topped seamount**, is a type of underwater mountain or seamount with a distinct **flat or gently sloping summit**. Guyots are characterized by their **plateau-like features**, in contrast to the pointed or peaked summits of typical seamounts. The flat top of a guyot is often believed to **result from the processes of erosion and subsidence**.

The formation of a guyot typically involves the following stages:

1) An underwater volcanic seamount forms with a conical peak, but over time, through **erosion caused by wave action and other geological processes, the summit becomes flattened.**
2) The guyot **gradually subsides or sinks beneath the ocean surface**. This combination of processes results in the **distinctive flat-topped structures**, called guyots.





Source: NCERT, Class XI, Chapter 12: Water (Oceans)

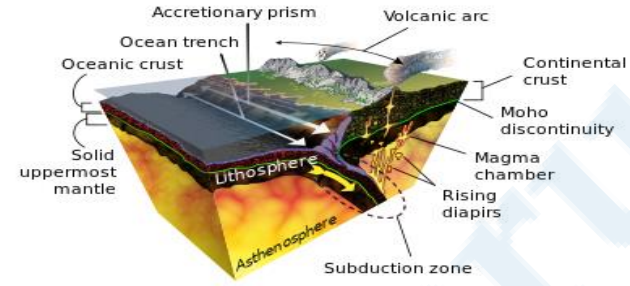
Q.47)

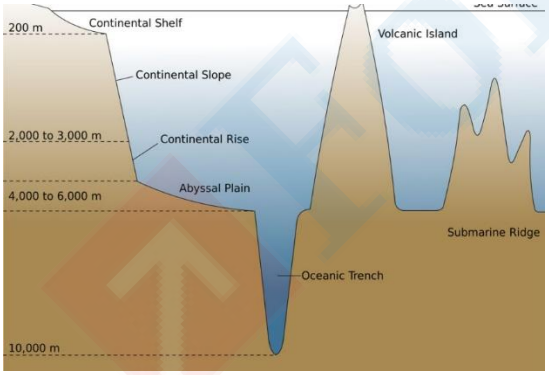
Ans) c

Exp) Option c is the correct answer.

Ocean trenches are **long, narrow depressions on the seafloor**. These chasms are the deepest parts of the ocean—and some of the deepest natural spots on Earth.

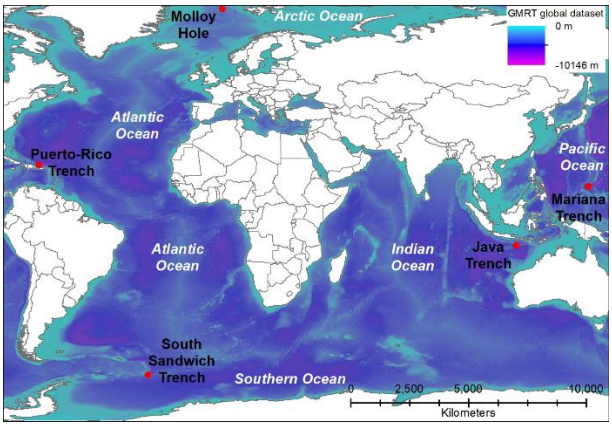
Statement 1 is correct: Convergent boundaries involve the collision or subduction of tectonic plates. **When one tectonic plate is forced beneath another, it creates a subduction zone, leading to the formation of oceanic trenches**. Examples include the Mariana Trench formed by the subduction of the Pacific Plate beneath the Philippine plate.





Oceanic trench and other oceanic landforms
(Source: National Geographic)

Statement 2 is correct: Oceanic trenches **are found in all the ocean basins on the planet.** The deepest ocean trenches of the Pacific Ocean are part of the **"Ring of Fire"** that also includes active volcanoes and earthquake zones.



Oceanic Trench in every ocean basin of the planet.

Statement 3 is correct: Oceanic trenches are known for **their extreme and inhospitable conditions**. The absence of sunlight at such depths results in the **absence of photosynthesis.** The **pressure is extremely high, temperatures are low, and the environment is dark**. Life in these trenches often **relies on chemosynthesis and marine snow**, where organisms extract energy from chemical reactions rather than sunlight. Marine snow is the continuous fall of organic and inorganic particles (including the remains of marine organisms, fecal matter, shells, and sand) from the upper layers of the water column to the seafloor. **Only organisms with high levels of adaptation can survive in these regions.**

Source: https://education.nationalgeographic.org/resource/ocean-trench/

Q.48)

Ans) c

Exp) Option c is the correct answer.

Out of the total water present on the planet earth, the majority is in the form of seas and oceans (more than 97%) and is termed as saline water. The remaining water is termed as **freshwater**.

Option c is correct: The decreasing order of proportion of freshwater on Earth is as follows:

Ice caps: 2.05%

Groundwater: 0.68%

Freshwater lakes: 0.01%

Atmosphere: 0.0019%

Rivers and streams: 0.0001%.

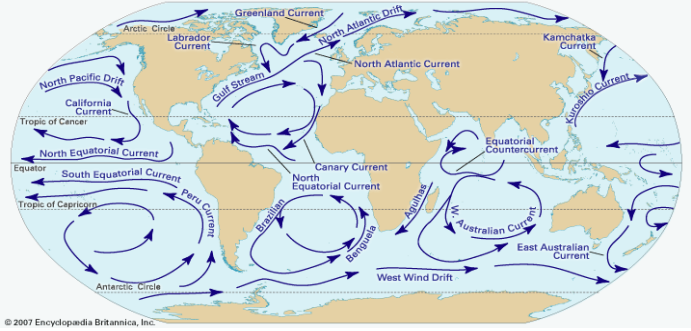
Source: Class VII NCERT - Chapter 5 (Water)

Q.49)

Ans) b

Exp) Option b is the correct answer.

The major ocean currents in the globe play a crucial role in regulating Earth's climate, distributing heat and nutrients, and influencing weather patterns.



Statement 1 is incorrect: El Nino refers to the periodic development of a warm ocean current along the Peruvian coast as a temporary replacement for the cold Peruvian Current. **The presence of El Nino leads to below average monsoon rainfall in India.**

Statement 2 is correct: The **Cold Canary Current** is a significant ocean current that flows southwards along the **western coast of Africa** and extends towards the equator. The presence of this current in the region led to the formation of the **Sahara Desert in the African region.** The cold current causes the winds to shed most of its moisture in the ocean before reaching the land, resulting in scarce rainfall.

Statement 3 is correct: It is true that the **mixing of warm and cold current creates foggy weather where precipitation occurs in the form of drizzle**. For example, the mixing of Labrador current (cold current) with Gulf of stream (warm current) causes drizzling in Newfoundland.

Source: Class XI NCERT Physical Geography - Chapter: Movements of Ocean water

G C Leong – Chapter 20: The Temperate Continental (Steppe) Climate

Q.50)

Ans) b

Exp) Option b is the correct answer.

Both surface and deep-water currents are integral components of the Earth's climate system, with each playing a distinct yet interconnected role in regulating global climate patterns.

Statement 1 is correct: Deep water currents are primarily driven by density differences in ocean waters, a process known as thermohaline circulation, which is influenced by variations in temperature and salinity. **Surface water currents**, on the other hand, are primarily driven by **wind stress,** which is the frictional force exerted by wind on the ocean surface.

Statement 2 is correct: Deep water currents typically move at much slower speeds compared to surface water currents. Surface currents can reach speeds of up to several knots, while deep water currents typically move at a few centimetres per second. This difference in speed is attributed to the **increased viscosity and resistance at deeper levels of the ocean.**

Statement 3 is incorrect: Both the surface and deep-water currents have a significant impact on the global climate. For example, the **deep-water currents** circulate cold, dense water from the poles towards the equator and then back again, creating a **global conveyor belt system that plays a crucial role in maintaining global climate.**

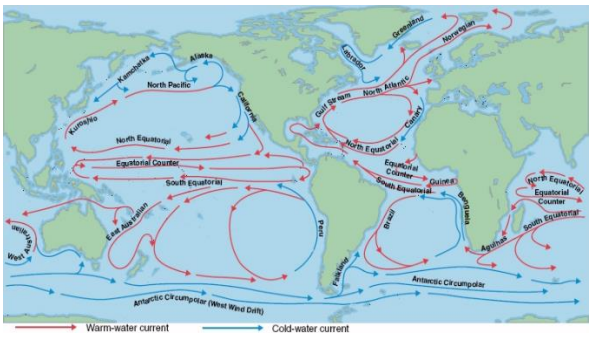
Source: Class XI NCERT Physical Geography - Chapter: Movements of Ocean water

Q.51)

Ans) b

Exp) Option b is the correct answer.

The major ocean currents in the globe play a crucial role in regulating Earth's climate, distributing heat and nutrients, and influencing weather patterns. These currents traverse vast distances, carrying immense volumes of water and profoundly impacting the marine environment.



Pair 1 is incorrect: The Humboldt Current, also called the Peru Current, is a cold ocean current that flows north along the **western coast of South America. Benguela** is a cold current that flows along the **western coast of Africa.**

Pair 2 is correct: The **Labrador Current** is a **cold** current in the **North Atlantic Ocean** which flows from the Arctic Ocean south along the **east coast of Canada near Nova Scotia.**

Pair 3 is incorrect: Agulhas is a warm current that flows south along the **east coast of Africa**. It forms the western boundary current of the southern Indian Ocean.

Pair 4 is correct: Kuroshio is a warm current, also called Japan current, is a strong surface oceanic current of the Pacific Ocean. It flows along the **east coast of Japan.**

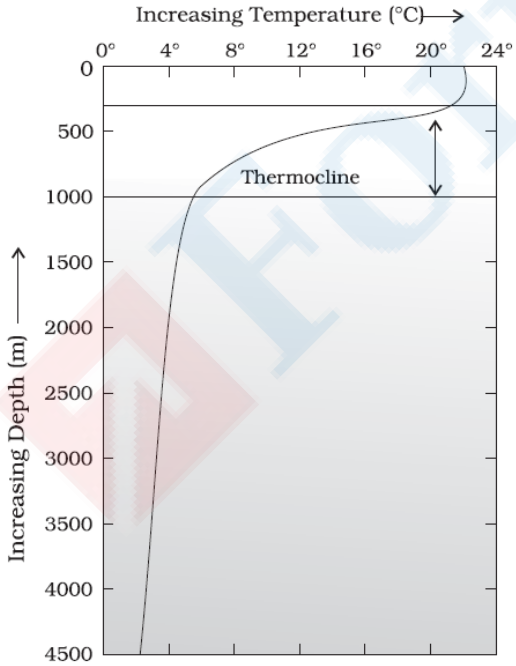
Source: G C Leong - Chapter: The Oceans

Q.52)

Ans) b

Exp) Option b is the correct answer.

A thermocline is the transition layer between the warmer mixed water at the surface and the cooler deep water below.



Option a is incorrect: Following is the temperature structure of the ocean:

The first layer represents the top layer of warm oceanic water with temperatures ranging between 20° and 25° C. The **second layer comprises thermocline** and the third layer is very cold and extends up to the deep
ocean floor.

Option b is correct: The thermocline layer is characterised by rapid decrease in temperature with increasing depth. Thermocline region begins around 100 - 400 metres below the sea surface and extends several hundred metres downward.

Option c is correct: In the ocean, the depth and strength of the thermocline vary from season to season and year to year. While it is semi-permanent in the tropics, it varies in temperate regions e.g. thermocline is deepest during the summer in temperate regions.

Option d is incorrect: In the Arctic and Antarctic circles, the **surface water temperatures are close to 0° C**. Thermocline is **shallow to non-existent in the polar region**s, where the water column is cold from the surface to the bottom.

Source: NCERT fundamentals of physical geography: Chapter- Oceans (Waters)

Q.53)

Ans) d

Exp) Option d is the correct answer.

Ocean currents are like river flow in oceans. They represent a flow of large volume of water in a definite path and direction. The flow of such water is influenced by the following factors:

Option 1 is correct: Heating by solar energy causes the water to expand. That is why, near the equator the ocean water is about 8 cm higher in level than in the middle latitudes. This causes a slight gradient and water tends to flow down the slope.

Option 2 is correct: **The Coriolis force** is caused by the **rotation of the earth** on its own axis. The Coriolis force intervenes and causes the water to move to the **right in the northern hemisphere and to the left in the southern hemisphere.**

Option 3 is correct: Wind blowing on the surface of the ocean **pushes the water to move**. **Friction** between the wind and the water surface affects the movement of the water body in its course. For example, trade winds influence the direction of ocean currents in the ocean.

Option 4 is correct: Differences in **water density affect vertical mobility of ocean currents.** Water with high salinity is denser than water with low salinity. Water with higher density tends to move towards the water with lower density.

Source: Class XI Physical Geography - Chapter: Movements of Ocean water

Q.54)

Ans) c

Exp) Option C is the correct answer.

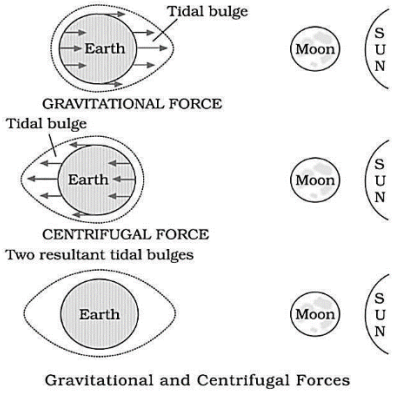
Tides, the periodic rise and fall of the ocean's surface, play a crucial role in shaping our planet's coastal environments and influencing human activities in profound ways. Tides hold immense importance, extending to various advantages such as **supporting the livelihoods of fishing communities.**

Option a is incorrect: The abundance of fishes during low tides are less compared to that of high tides because deeper pools and wider ocean connections at high tide allow more fishes to enter the region. Further the **exposed seabed (during low tide) can damage the net** and rendering it less preferred action for the fisherman.

Option b is incorrect: High tide generally expands the available habitat for fish as water covers more ground. While there might be more space for fish to move during high tide, it could be more **challenging for the fisherman to locate and catch fishes due to their spread-out distribution.**

Option c is correct: After high tide, as the water recedes, **fishes might move towards shallower areas to feed on newly exposed areas**. Casting the net shortly after high tide could target actively feeding fish in these shallower regions, thus maximising the catch of the fisherman.
Option d is incorrect: Increased water movement can stimulate fish activity and attract them to areas of the net. However, casting a net **during strong currents can be difficult and dangerous, especially for small boats**.
Source: Class XI Physical Geography - Chapter: Movements of Ocean water

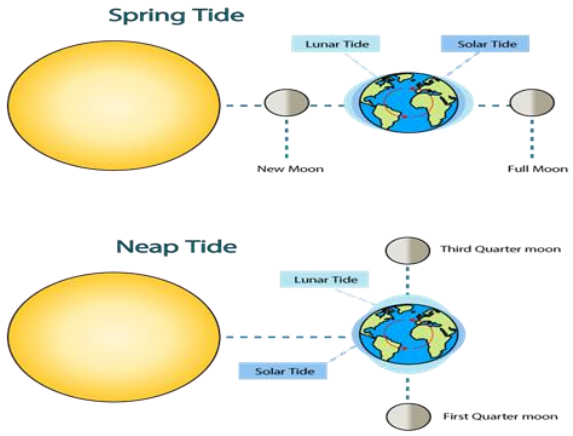
Q.55)
Ans) b
Exp) Option b is the correct answer.
The periodical rise and fall of sea level twice a day mainly due to the attraction of the sun and moon are termed as tides.



Gravitational and Centrifugal Forces

Option 1 is correct: The gravitational force of both the Sun and the moon on earth are responsible for the creation of tides. The force of the moon exerts a great influence in the formation of tide compared to the sun's influence on the earth. The moon's gravitational pull to a great extent and the sun's gravitational pull to a lesser extent are the major causes for the occurrence of tides.
Option 2 is correct: **Centrifugal force of the earth is one of the factors responsible for the cause of tides**. Centrifugal force is the force that acts to counterbalance the gravitational force. The centrifugal force along with the gravitational pull are responsible for creating the **two major tidal bulges** on the earth.
Option 3 and 4 are incorrect: Movement of water caused by **winds and atmospheric pressure** changes are called **surges, not tides.** Hence action of winds on oceans nor the difference in atmospheric pressure are not responsible for generation of tides.
Source: Class XI Physical Geography - Chapter: Movements of Ocean water

Q.56)
Ans) c
Exp) Option c is the correct answer.



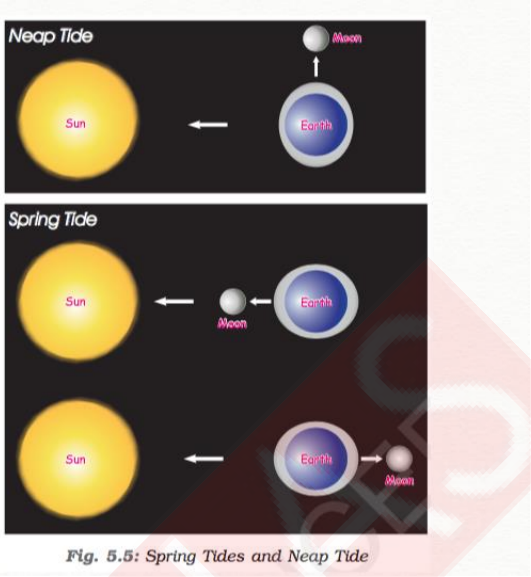


Fig. 5.5: Spring Tides and Neap Tide

Statement-I is correct: Spring tides happen when the sun and moon's gravity pull together, making the ocean tides **higher than usual**. **Neap tides** occur when the gravitational forces of the sun and the moon are at right angles to each other, weakening their combined pull on the oceans, leading to **lower-than-average tides.**

Statement-II is incorrect: Spring tides typically occur around the time of the **new moon and the full moon** when the Sun, Moon and Earth are in straight lines. On the other hand, **neap tides** typically occur normally **7 days after spring tides when the sun, the earth and the moon is at right angles to each other.**

Source: Class XI Physical Geography - Chapter: Movements of Ocean water

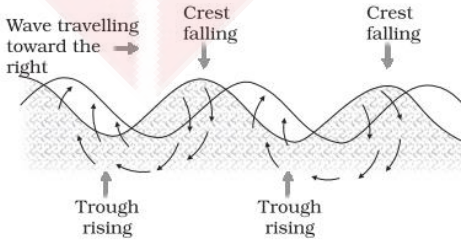
Q.57)

Ans) a

Exp) Option a is the correct answer.

Ocean waves are the up and down movement of water in the ocean. These travel through the vast expanses of the Earth's oceans. **They represent a complex interplay of energy transfer through water**, influenced by atmospheric conditions, wind patterns, and the underlying topography of the ocean floor.

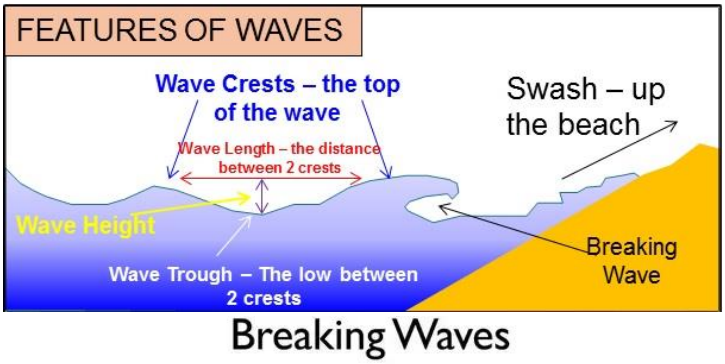
Statement 1 is incorrect: The oceanic waves are the **transfer of energy** through the medium of water. As waves move through the water, **individual water particles generally oscillate in place,** passing the energy along rather than undergoing significant horizontal movement. This implies that **water does not actually travel in waves. Waves transmit energy, not water.** This is why a floating object, like a boat, will bob up and down as a wave passes but won't necessarily be carried far horizontally.



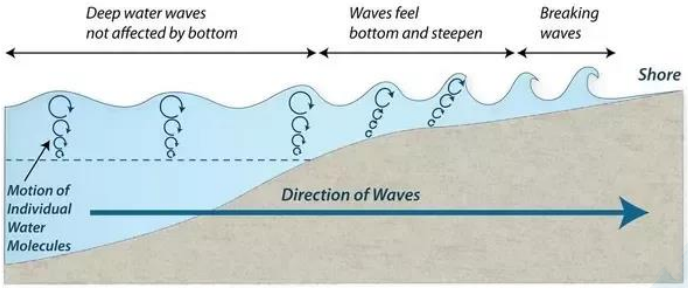
Movement of waves and water molecules

Statement 2 is incorrect: Wavelength is the horizontal distance between two successive crests (the highest point of a wave). **Waves typically break when the depth of the water is approximately equal to**

half the wavelength. When waves approach shallower waters, the lower part of the wave slows down due to the interaction with the sea floor. This is due to the friction occurring between the dynamic water and the sea floor.



Breaking Waves



Breaking of waves.

Statement 3 is correct: Wind is a significant factor in generating waves. **The stronger the wind, the more energy is transferred to the water surface, resulting in larger waves**. Factors such as the duration and fetch (the distance over which the wind blows) also play a role in determining wave height. Once generated, waves can travel across vast distances, **carrying the energy imparted by the wind.**

Source: Class 11, Fundamentals of Physical Geography, Chapter 13 (Movements of Ocean Water)

Q.58)

Ans) b

Exp) Option b is the correct answer.

Deltas are wetlands that form as rivers empty their water and sediment into another body of water, such as an ocean, lake, or another river. Deltas are formed due to the **slow and steady flow of rivers.** As rivers approach their mouths or ends, the decrease in velocity leads to the deposition of sediment, giving rise to deltas.

Statement 1 is incorrect: While deltas are commonly formed when rivers empty into oceans or seas, they **can also form when rivers empty into lakes or other rivers**. However, inland deltas, which empty into a plain, are **extremely rare.** The **Okavango Delta in Botswana** is probably the most well-known inland delta. It is so unusual that it is recognized as one of the "Seven Natural Wonders of Africa." Water from the Okavango River never reaches another body of water. The delta spreads water and silt across a flat plain in the Kalahari Desert before getting evaporated.

Statement 2 is correct: Tidal actions enhance sediment deposition and contribute to the formation of deltas. These deltas are **usually formed in the areas with large tidal range** (I.e. an area between high tide and low tide). For example, the **Ganges-Brahmaputra Delta is a tide-dominated delta,** caused due to rise and fall of tides in the Bay of Bengal. However, **sometimes tide also limit the formation of delta.** For

example, the **river Amazon does not form a delta**. This is because, the tides of Atlantic Ocean are too strong to allow silt to create a delta on the River.

Statement 3 is correct: The delta formation activity is very much limited in the Western coast of India. This is because the **slope of western ghats is steep**, leading to the **rapid flow of rivers flowing to the west coast**. Also, these rivers **do not travel much distance to drain into the sea**. So, they do not carry much sediment to form a delta. Also, the **western coast is submerging one, having higher depth**. This creates difficulty in the accumulation of sediments.

Knowledge Base: Deltas are often highly suitable for agricultural activities because of the accumulation of nutrient-rich sediments. The sediment, known as alluvium or silt, is rich in nutrients that support the growth of plants. Examples include the Ganges-Brahmaputra Delta in India and Bangladesh, where crops like rice and tea thrive. **Deltas are known for their fertile soil, making them important agricultural regions.**

Source: https://ncert.nic.in/textbook/pdf/kegy103.pdf
https://education.nationalgeographic.org/resource/delta/

Q.59)

Ans) c

Exp) Option c is the correct answer.

The horizontal distribution of salinity in ocean waters refers to the variation in salt concentration across different regions of the world's oceans. Salinity is a measure of the amount of dissolved salts, mainly sodium chloride (table salt), in seawater and is usually expressed in parts per thousand (ppt) or practical salinity units (PSU).

Statement 1 is incorrect: The highest salinity in ocean water is typically found in subtropical regions, **particularly around 15-20 degrees latitude in both hemispheres**. The **polar regions often have lower salinity** due to melting ice, which introduces freshwater into the ocean, reducing overall salinity.

Statement 2 is correct: The Black Sea has relatively **low salinity compared to many other oceanic regions and the average oceanic salinity, due to significant freshwater input from various rivers**, including the Danube, Dnieper, Don, and others. The influx of freshwater decreases the overall salinity of the Black Sea. Basically, ocean water salinity is expressed as a ratio of salt (in grams) to liter of water, it is written parts per thousand (ppt). In sea water, there is close to 35 grams of dissolved salts in each liter (35ppt) on an average, but ranges between 33-37 grams per liter (33ppt - 37ppt). On the other hand, the salinity of the Black Sea's surface waters averages between 17 and 18 parts per thousand, which is approximately half that of the oceans.

Statement 3 is correct: The Arabian Sea tends to have **higher average salinity compared to the Bay of Bengal**. The Bay of Bengal receives substantial freshwater input from several major rivers, such as the Ganges, Brahmaputra, and others, which lowers its average salinity. In contrast, the Arabian Sea, being more open (high rate of evaporation) and **relatively less influenced by riverine discharge,** typically has higher average salinity.

Source: Class 11, Fundamentals of Physical Geography, Chapter 12 Pg: 105
https://www.nio.res.in/files/view/29fbd01f222086c#:~:text=Salinity%20near%20the%20surface%20in%20the%20Arabian%20Sea%20is%20much,receives%20relatively%20less%20river%20runoff.

Q.60)

Ans) c

Exp) Option c is the correct answer.

The temperature of ocean water varies by location, both in terms of latitude and depth, due to variations in solar radiation and the physical properties of water. At low latitudes, near the equator, direct overhead sunlight received all year warms surface waters. At high latitudes, ocean waters receive less sunlight.

Statement I is correct: The highest surface temperatures in the oceans are **not recorded precisely at the equator but slightly north of it.** This is due to a combination of factors, including the **angle of the sun's rays, the distribution of land and water, and the circulation patterns of the atmosphere.** The angle of the sun's rays is more direct in the Tropics, leading to greater heating of the Earth's surface. The circulation patterns of the atmosphere, such as the Hadley cell circulation, contribute to the concentration of heat in the Tropics.

Statement II is incorrect: The **freshwater discharge through rivers is not maximum near the equatorial ocean region.** The maximum freshwater discharge occurs in the tropical regions, which are located between 23.5°N and 23.5°S latitudes.

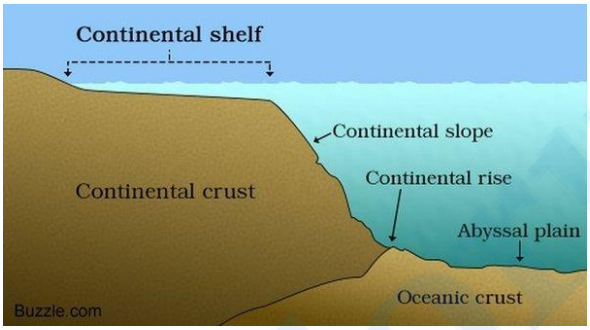
Source: Class 11, Fundamentals of Physical Geography, Chapter 12 Pg: 104

Q.61)

Ans) b

Exp) Option b is the correct answer.

The **continental shelf** is a gently sloping underwater landmass that extends from the edge of a continent to a point known as the shelf break, where it transitions to the continental slope. This submerged area is part of the continental crust and is shallower compared to the deeper oceanic areas beyond the shelf break.



Statement 1 is incorrect: Continental shelves **cover less than 10 percent of the total area** of the oceans. They do not constitute more than 50 percent of the total area of the oceans. They are relatively shallow and extend from the coastline to the shelf break, but the majority of the ocean's area is occupied by the deeper regions beyond the continental shelves.

Statement 2 is correct: Continental shelves are known for their **potential as areas rich in fossil fuel deposits, including oil and natural gas**. Over millions of years, organic matter from land has accumulated in these shallow areas, creating conditions suitable for the formation of hydrocarbon reserves. 30 percent of all the oil and 20 percent of the natural gas produced in the U.S. comes from offshore drilling. Most of these sites are on the North American continental shelf off Alaska and the Gulf of Mexico.

Statement 3 is incorrect: Continental shelves are rich in marine life. They are highly **productive areas supporting diverse ecosystems** due to their relatively shallow depths, which allow sunlight to penetrate, fostering abundant plant growth and providing habitats for numerous fish, shellfish, marine mammals, and other organisms. They are important feeding and breeding grounds for marine life.

Source: Class 11, Fundamentals of Physical Geography, Chapter 12 Pg: 102
https://education.nationalgeographic.org/resource/continental-shelf/

Q.62)

Ans) d

Exp) Option d is the correct answer.

The erosional activity varies between the Western and Eastern coasts of India due to differing geological features, climate patterns, and coastal dynamics.

Statement-I is *incorrect*: While the **erosional activities dominate the west coast, depositional activities dominate the east coast of India.** The western coasts of India, along the Arabian Sea, experience significant erosional activity due to the impact of strong waves. Conversely, the **Eastern coasts of India, along the Bay of Bengal, are characterized by substantial depositional activities caused by east flowing rivers.**

Statement-II is correct: Numerous significant rivers like the **Ganges, Brahmaputra, and Godavari flow eastward,** emptying into the Bay of Bengal along the Eastern coast. These rivers transport **substantial sediment loads, forming deltas** along the Eastern coast, thereby establishing **depositional activity a dominant feature.**

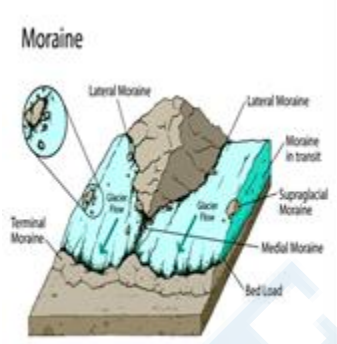
Source: NCERT Class XI- Fundamentals of Physical Geography- Chapter: Landforms and their Evolution

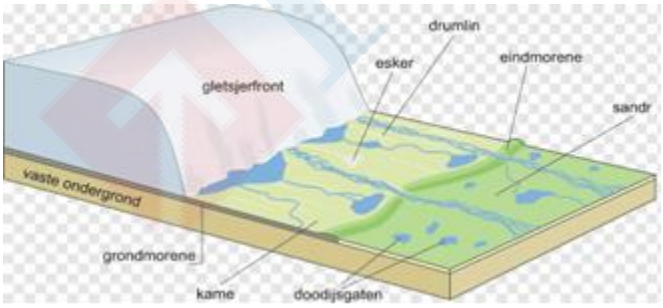
Q.63)

Ans) b

Exp) Option b is the correct answer.

Glaciation generally gives rise to erosional feature in the uplands and depositional features on the lowlands. The lowlands of glaciers formed primarily by the deposition activities of glaciers exhibit distinct features.

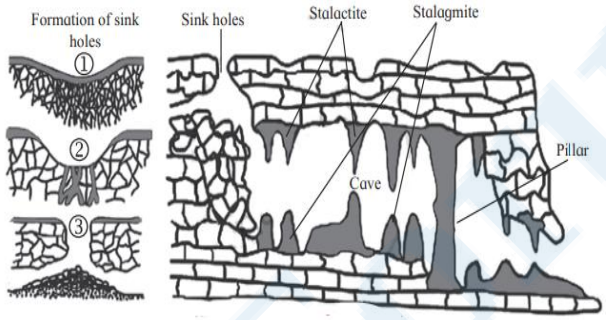




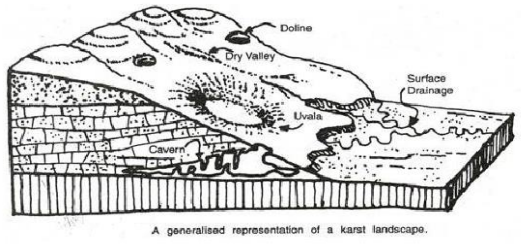
Pair 1 is incorrect: Moraine is material left behind by a moving glacier. Moraine refers to the **residue deposited by a glacier in motion, typically composed of soil and rock.** Similar to how rivers transport a variety of debris and silt that gradually accumulate to create deltas, glaciers carry diverse dirt and boulders that accumulate, shaping and forming moraines.

Pair 2 is incorrect: Fjords are **deep, narrow coastal valleys formed by glacial erosion** and subsequently flooded by seawater. It is found in regions with high mountains and past glaciation. A fjord is formed when a glacier retreats, after carving its typical U-shaped valley, and the sea fills the resulting valley floor.
Pair 3 is correct: Eskers are long, winding **ridge or mound of sediment consisting of sand and gravel,** formed usually as a result of deposition activity of melted river flown from glaciers. Eskers are associated with glaciated lowlands. Eskers are commonly found in regions that were covered by glaciers during past ice ages. They are often seen in areas with glacial deposits, such as drumlins, outwash plains, and kettles.
Pair 4 is correct: Erratics are a distinctive type of glacial landform that consists of a **large, isolated boulder or rock** that is different in composition from the bedrock and other surrounding rocks of the area. Glaciers carry rocks along their path of movement and eventually these **rocks are deposited in the landscape far away from the origin of glaciers**. Erratics are typically associated with glaciated lowlands.
Source: NCERT Class XI- Fundamentals of Physical Geography- Chapter: Landforms and their Evolution

Q.64)
Ans) a
Exp) Option a is the correct answer.
Limestone topography, also known as karst topography, is a unique and distinctive landscape that forms in regions where there is a significant presence of limestone bedrock. It is characterised by a variety of surface and subsurface features created through the chemical weathering and dissolution of limestone by water.

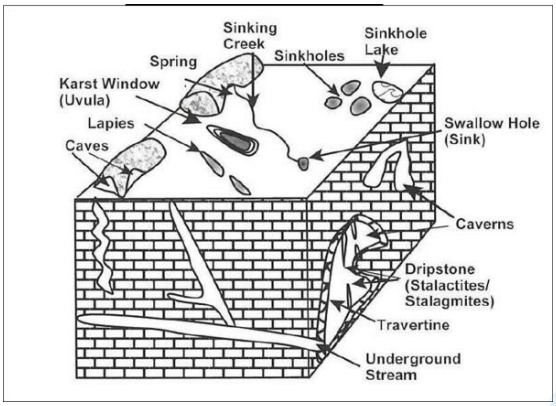


Pair 1 is incorrect: Stalagmites are mineral formations that rise from the floor of a cave. They are formed by the dripping of mineral-rich water from the cave ceiling. As the water evaporates, minerals are deposited, building the stalagmite upwards.
Stalactite is a column of rock that hangs from the roof of a cave and is formed over a very long period of time by drops of water containing lime falling from the roof
Pair 2 is correct: Uvalas are closed karst depressions usually larger than a sinkhole and they are a smaller opening in the ground caused by the collapse of a cave roof. **Uvalas form when several sinkholes merge together**. They are typically formed when the roofs of underground caves or caverns collapse, creating surface depressions.



Pair 3 is incorrect: Lapies are **uneven ridges** that form when the majority of the limestone's surface is removed by the solution process. They are formed by the dissolving action of rainwater and surface runoff. As water flows over the limestone, it dissolves the rock, creating pitted and grooved patterns on the surface.

Numerous needle-shaped dripstones hanging from the cave ceiling are called Drapes or Curtains



Source: NCERT Class XI- Fundamentals of Physical Geography- Chapter: Landforms and their Evolution

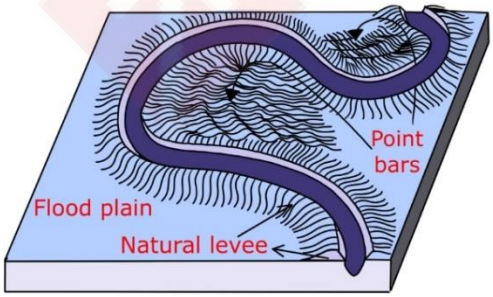
Q.65)

Ans) b

Exp) Option b is the correct answer.

Natural levees are an important landform **associated with floodplains**. These are formed during the old stage of a river.

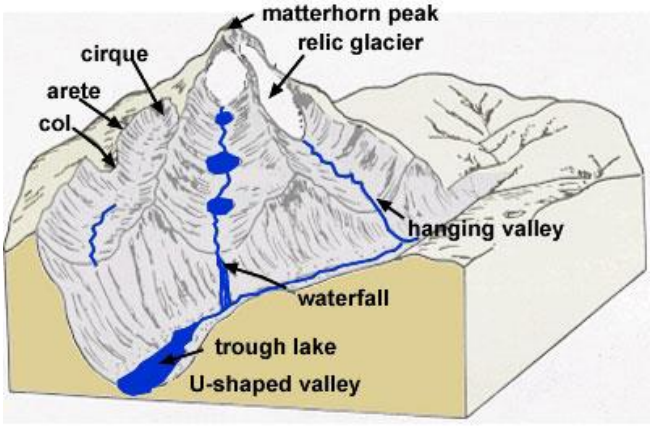
Statement 1 is incorrect: Natural levees are **not found in desert landscapes**. Instead, they are **common features along the banks of large rivers**. Natural levees form during river floods **when water overflows its banks. Gradually, water slows down leading to deposition of coarser sediments along the riverbanks.**



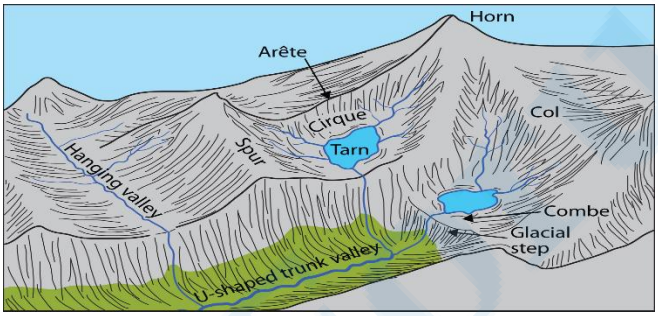
Natural Levees and Point Bars

Statement 2 is correct: Natural levees **are depositional landforms**. These are low, linear ridges of coarser deposits along the banks of rivers**. During flood events, the sediments (primarily coarse material) get deposited on the banks of a river** forming these **elevated ridges parallel to the river channel.** The deposition of sediment contributes to the growth of these features. Hence, the given option is correct.
Source: NCERT, Class XI, Chapter 6 (Landforms and their Evolution)

Q.66)
Ans) a
Exp) Option a is the correct answer.



Erosional features left by valley glacier when the ice disappears.



Option a is correct: Cirques are bowl-shaped depressions formed at the head of a glacier or valley by the erosive action of a glacier. As the ice moves downhill, it **plucks and abrades the bedrock**, gradually creating these bowl-shaped depressions known as Cirques.
Option b is incorrect: Hanging valleys are smaller valleys that are left 'hanging' above the main valley, often formed due to the **differential erosion of tributary glaciers with respect to the main glacie**r.
Option c is incorrect: An **arete** is a narrow**, sharp-edged ridge formed between two cirques** due to erosion by glaciers on either side.
Option d is incorrect: Roche moutonnée refers to a **rock smoothed and polished by the passage of a glacier. I**t typically has a gently sloping side that faces the direction of the glacier's movement and a steep side that faces away.
Source: NCERT Class XI- Fundamentals of Physical Geography- Chapter: Landforms and their Evolution

Q.67)
Ans) b
Exp) Option b is the correct answer.

Drainage pattern are governed by the topography of the land, whether a particular region is dominated by hard or soft rocks, and the gradient of the land.
Pair 1 is correct: Dendritic pattern is also known as pinnate drainage and looks like branching of a tree. These are mainly found in regions with homogenous materials and develop where rock beneath the stream has no particular structure.
Pair 2 is correct: Trellis drainage system is generally formed where sedimentary rocks have been folded or tilted and then eroded to varying degrees. The short subsequent streams meet the main stream at right angles. Through soft rocks differential erosion paves the way for tributaries.
Pair 3 is incorrect: In radial drainage system, the streams radiate outwards from a central high point. For example, rivers originating from Amarkantak range forms a radial system. In centripetal drainage system, rivers discharge their waters from all directions into a lake or depression. The centripetal drainage system is similar to the radial drainage system, with the only exception that radial drainage flows out versus centripetal drainage flows in.

Q.68)
Ans) d
Exp) Option d is the correct answer.
The China type of climate is observed on the Eastern boundaries of the Continents in warm temperate latitudes. It exhibits heat in summers and extreme cold in winters. This type of climate is also observed in the Southern parts of Japan.
Statement 1 is incorrect: China type of Climatic Conditions are characterized by 'temperate monsoonal' features. The great landmass of the region induces pressure change between summer and winter. The region is known to have South-East Monsoon conditions.
Statement 2 is incorrect: During summers, intense heat creates low pressure and brings Southeast Monsoon. This causes heavy rain in the region. During winters, pressure gradient between cold Mongolia, Siberia and warm Pacific leads to outflow of air from the region as Northwest Monsoon. Hence, winters are cold and dry with little rain with snow on the windward slopes.
Important Tips: Warm temperate eastern margin climate is typified by a warm, moist summer & a cool, dry winter strongly modified by maritime influence. Different variants of Warm Temperate Eastern Margin Climate include the
1. Temperate monsoon Climate or China Type Climate,
2. Gulf Type Climate and
3. Natal Type Climate.
Found between 20° and 35° N and S latitude (warm temperate latitudes just outside the tropics); on the east coast in both hemispheres.

Q.69)
Ans) b
Exp) Option b is the correct answer.
Option b is correct. Duars are alluvial floodplains found in Darjeeling and Sikkim Himalayas. They are the result of folding during the formation of the Himalayas. They are home to many endangered species like one horned rhino and tiger. National parks and wildlife sanctuaries are found in large numbers such as Manas, Jaldpara, Buxa National Parks and Mahananda Wildlife Sanctuary.
Option a is incorrect. The Shivalik Hills, also known as Churia Hills, are a mountain range of the outer Himalayas that stretches from the Indus River about 2,400 km eastwards close to the Brahmaputra River.
Option c is incorrect. Karewas are lacustrine deposits with a thickness of about 1400 m. It lies between the Pir Panjal Range and the Great Himalayan Range, in Northwest India. The world-famous variety of saffron, which is locally known as "zafran" is cultivated on this deposit.

Option d is incorrect. Backwaters in Kerala are known as Kayals. They are a network of brackish lagoons and lakes lying parallel to the Arabian Sea coast of Kerala.

Q.70)
Ans) a
Exp) Option a is the correct answer.
Statement 1 is incorrect. The rate of decrease of temperature with depths is greater at the equator than at the poles. Though the surface temperature of the seas decreases from equator towards the poles but the temperature at the ocean bottoms is uniform from the equator towards the pole, which means that the rate of decrease of temperature with increasing depth is more rapid near the equator than towards the poles.
Statement 2 is correct. The winds blowing from the land towards the oceans drive warm surface water away from the coast resulting in the upwelling of cold water from below.
Statement 3 is incorrect. The enclosed seas in the low latitudes record relatively higher temperature than the open seas. Whereas the enclosed seas in the high latitudes have lower temperature than the open seas.
Important Tips: Other Factors affecting temperature Distibution in the oceans/seas
• Salinity: Boiling point of the sea water increases with the salinity levels and vice versa.
• Submarine ridges and sills: Temperature is affected due to lesser mixing of waters on the opposite sides of the ridges or sills.
• The shape of the ocean: The latitudinally extensive seas in low latitude regions have warmer surface water than longitudinally extensive sea.

Q.71)
Ans) b
Exp) Option b is the correct answer.
Playa is a flat, shallow depression or basin on the floor of a desert or arid region, which is usually dry but may temporarily hold water after heavy rainfall. Playas are also known as dry lake beds, alkali flats, or salt pans.
Playas form through a process known as deflation, in which wind erosion removes sediment and leaves behind a depression in the landscape.
During heavy rainfall, water flows into the playa basin, where it may form a shallow temporary lake or pond. As the water evaporates, it leaves behind mineral deposits such as salt, which can accumulate over time and create a hard, compacted surface on the playa.
Playas are important habitats for wildlife in desert regions, particularly for migratory birds and waterfowl.

Q.72)
Ans) a
Exp) Option a is the correct answer.
The Beas River is a river that flows through the states of Himachal Pradesh and Punjab in India. The Beas River flows through several major towns and cities including Kullu, Mandi, and Kangra in Himachal Pradesh, and Hoshiarpur and Kapurthala in Punjab. It is an important source of water for irrigation and drinking water for these regions.
Statement 1 is incorrect: The Beas originates near the Rohtang Pass on the southern end of the Pir Panjal Range. The Jhelum has its source in a spring at Verinag in the southeastern part of the Kashmir Valley.
Statement 2 is incorrect: Beas River meets the Satluj River (not Ravi) at Harike in Punjab. It is a comparatively small river which is only 460 km long but lies entirely within the Indian territory.

Statement 3 is correct: The Indus Water Treaty, signed in 1960 between India and Pakistan, divided the six rivers of the Indus basin between the two countries. The eastern rivers, including the Beas River, were allocated to India for unrestricted use. Under the Indus Waters Treaty signed between India and Pakistan in 1960, all the waters of three rivers, namely Ravi, Sutlej and Beas (Eastern Rivers) were allocated to India for exclusive use. The waters of Western rivers - Indus, Jhelum, and Chenab were allocated to Pakistan except for specified domestic, non-consumptive and agricultural use permitted to India as provided in the Treaty.

Important Tips

- Beas River, an important river of the Indus River System, emerges from Rohtang pass in HP
- The river before entering Pakistan merges with the Sutlej River at Hari-Ke-Pattan in Punjab
- The tourist resorts of Manali is situated on the right banks of the river Beas.
- Beas River lies entirely within the Indian territory.

Q.73)

Ans) a

Exp) Option a is the correct answer.

Seismology is the scientific study of earthquakes and the propagation of elastic waves through the Earth or through other planet-like bodies. It has various applications that help us to understand the Earth's structure, dynamics, and evolution.

Option 1 is correct: Seismic waves are used to monitor the behavior of active volcanoes. When a volcano becomes active, the movement of magma beneath the surface generates seismic waves that can be detected by seismometers. Seismic waves can provide information on the location, depth, and intensity of volcanic activity. This information can be used to predict volcanic eruptions and to develop evacuation plans to protect people living in the vicinity of a volcano.

Option 2 is correct: Seismology can be used to study the properties of rocks and soils beneath the surface. By analyzing the way seismic waves travel through the Earth, scientists can infer the density, porosity, and permeability of the subsurface layers. This information can be used to locate and evaluate groundwater resources.

Option 3 is incorrect: Mapping the distribution of plant species is not an application of seismology. Seismology primarily deals with the study of seismic waves generated by earthquakes and other sources of ground motion.

Option 4 is correct: Seismology is essential in understanding the theory of plate tectonics, which explains the movement of the Earth's crustal plates. Seismic waves generated by earthquakes can be used to determine the location and depth of the boundaries between tectonic plates. This information can be used to develop models of plate movements and to understand the formation of mountain ranges, ocean basins, and other geological features.

Important Tips - P and S waves:

- P-waves move faster and are the first to arrive at the surface. The P-waves are similar to sound waves. They travel through gaseous, liquid and solid materials. P-waves vibrate parallel to the direction of the wave.
- S-waves arrive at the surface with some time lag. They can travel only through solid materials. The direction of vibrations of S-waves is perpendicular to the wave direction in the vertical plane.

Q.74)

Ans) c

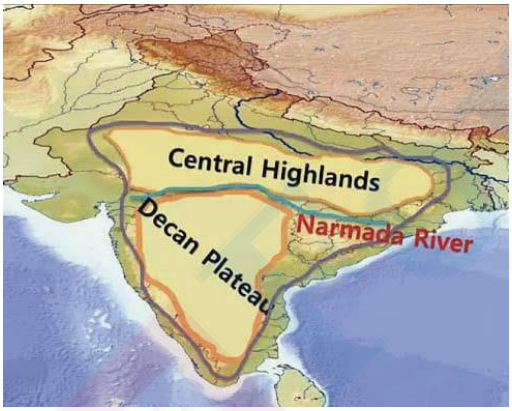
Exp) Option c is the correct answer.

The Ministry of Agriculture and Farmers Welfare has restricted the use of glyphosate, a widely used herbicide, citing health hazards for humans and animals. The new notification mandates that all

certificates of registration for the chemical that companies have to get for its manufacture or sale have now to be returned to the registration committee.
Glyphosate is a non-selective herbicide widely used in agriculture to control the growth of weeds and unwanted vegetation. It works by inhibiting the activity of an enzyme essential for plant growth, causing the plants to eventually die. However, Glyphosate can also kill desirable plants if not used carefully and selectively.

Q.75)
Ans) c
Exp) Option c is the correct answer.
The Coral Triangle is a geographic region in the western Pacific Ocean. It is named for its high levels of biodiversity, particularly in terms of coral species, and is often referred to as the "Amazon of the Seas." It spreads across the 6 countries (CT6) of – Indonesia, Malaysia, Papua New Guinea, the Philippines, the Solomon Islands and Timor Leste.
The Coral Triangle is home to over 600 species of reef building corals, which is more than 75% of all known coral species in the world. It is also home to thousands of species of fish, mollusks, and other marine organisms, making it one of the most diverse marine ecosystems on the planet.

Q.76)
Ans) b
Exp) Option b is the correct answer.
The Central Highlands are the parts of the Peninsular plateau to the north of the Narmada River that encompass a major portion of the Malwa plateau. This is the northernmost limit of the Deccan plateau. The rivers that drain this region, especially the Chambal, Sindh, Betwa, and Ken, run from southwest to northeast, showing the slope.



The Central Indian Highlands region is dominated by tropical deciduous forests. These forests are characterized by the shedding of leaves by trees during the dry season, and the subsequent regrowth of leaves during the wet season. The peninsular Sal (Shorea robusta) forest in the east and Teak (Tectona grandis) in the west dominate the natural vegetation of the Central Indian Highlands.
Important Tips
• Moist Evergreen Forests are mainly found in southern India along the Western Ghats, Andaman and Nicobar Islands and north-eastern region.
• Semi Evergreen Forests are mainly found in the less rainy parts of the regions where moist evergreen forests are found; Western Ghats, Andaman and Nicobar Islands, and the Eastern Himalayas.
• Dry evergreen forests are found in the Shivalik Hills and foothills of the Himalayas up to a height of 1000meterss in the north.

• Moist Deciduous Forests are found in the northeastern states along the foothills of Himalayas, eastern slopes of the Western Ghats and Odisha.
• Dry Deciduous Forests are Found throughout the northern part of the country except in the northeast. Also found in Madhya Pradesh, Gujarat, Andhra Pradesh, Karnataka, and Tamil Nadu.

Q.77)
Ans) c
Exp) option c is the correct answer.
Heat loss or heat gain is a function of surface area. Since small animals have a larger surface area relative to their volume, they tend to lose body heat very fast when it is cold outside; then they have to expend much energy to generate body heat through metabolism. This is the main reason why very small animals are rarely found in polar regions.

Q.78)
Ans) b
Exp) Option b is the correct answer.
Statement 1 is correct: According to the United Nations Environment Programme, there are more cold-water coral reefs worldwide than tropical reefs. The largest cold-water coral reef is the Rost Reef off Norway.
Statement 2 is incorrect: Like tropical corals, they provide habitat to other species, but deep-water corals do not require zooxanthellae to survive.
Statement 3 is correct: Deep-sea corals together with other habitat-forming organisms host a rich fauna of associated organisms. Lophelia reefs can host up to 1,300 species of fish and invertebrates. Various fish aggregate on deep sea reefs.
Deep sea corals, sponges and other habitat-forming animals provide protection from currents and predators, nurseries for young fish, and feeding, breeding and spawning areas for numerous fish and shellfish species.

Q.79)
Ans) d
Exp) Option d is the correct answer.
Option 1 is incorrect: Corbett National Park is in the Nainital district of Uttarakhand, and it was established in 1936 during British rule in India. The Park is located on the banks of river Ramganga (tributary of Ganga), not river Ganga. This park was the first to come under the Project Tiger initiative in 1973.
Option 2 is correct: The Sundarbans National Park is in West Bengal, India. The park is situated on the bank of Ganges River delta near the mouth of the Bay of Bengal. The Sundarbans National Park is densely covered by mangrove forests and is one of the largest reserves for the Royal Bengal
tiger.
Option 3 is incorrect: The Dudhwa National Park is situated in the Indo-Nepal border in the Lakhimpur Kheri District in Uttar Pradesh. The Dudhwa NP is not located on the banks of river Ganga, the park is located near Ghagra river (which is a tributary of Ganga River).
Option 4 is correct: The Gangotri National Park is in Uttarkashi District of Uttarakhand and Gangotri glacier, the origin of river Ganga, is located inside Gangotri National Park. As such it is clear that Gangotri national park is located on the banks of river Ganga. Various rare and endangered species like Musk deer, Snow leopards etc, can be seen in this park.

Q.80)
Ans) b
Exp) Option b is the correct answer.
Crop rotation is the practice of planting different crops sequentially on the same plot of land to improve soil health, optimize nutrients in the soil, and combat pests and weed pressure.
Statement 1 is correct: Crop rotation helps return nutrients to the soil without synthetic inputs. Crop rotation allows the land to regenerate and rejuvenate its own nutrients without having to apply more nutrients through the use of fertilizers.
Statement 2 is correct: Soil erosion is the carrying away of the most important topsoil layer by wind or water. When the soil is constantly covered by plants, the topsoil layer is not carried away by water during heavy rainfall. Crop rotation helps reduce raindrop impact on the soil and general erosion by water because the roots of the plants hold the top layer of soil together. Trees planted together with crops on the farms also assist in preventing soil erosion.
Statement 3 is incorrect: Crop rotation increases the harvest obtained from a single seasonal harvest. Because of the incorporation of different crop types, one gets not only a variety of crops after each season but also a general bounty harvest. Some scientific evidence proves a 10 to 25% increase in crop yield in crop rotation rather than monoculture.
Statement 4 is incorrect: Crop rotation does not increase the infestation of pests, but it limits the concentration of pests and diseases. Similar plants tend to have the same pathogens; therefore, crop rotation interrupts the pest life cycle and their habitat This lowers the risk of plants getting infested and allows the farmer to grow crops each season without using pesticides, which is good for the environment.

Q.81)
Ans) a
Exp) Option a is the correct answer.
Sea Basin Countries
Red Sea - Djibouti, Egypt, Eritrea, Saudi Arabia, Sudan, Yemen
Caspian Sea - Armenia, Azerbaijan, Georgia, Iran, Kazakhstan, Russia, Turkey, Turkmenistan, Uzbekistan
Bering Sea - Russia, United States of America
North Sea - UK, Norway, Germany, Denmark, Netherland, Belgium, Luxemburg, France, Switzerland, Italy, Austria

Q.82)
Ans) a
Exp) Option a is the correct answer.
Option a is correct: The Umngot River, or Dawki River as it is popularly known, is in the border town of Dawki, and is said to be one of the cleanest rivers in the Indian Subcontinent. It is located in the West Jaintia Hills district of the Indian state of Meghalaya. The Dawki town is on the Indo-Bangladesh border and is one of the historical trading posts of Colonial India. The Umngot River flows between the Jayantia and Khasi Mountain ranges as a natural divider between two ranges and between two countries.
Option b is incorrect: Subansiri River is also known as the "Gold River" is the biggest tributary of the upper Brahmaputra River that flows through the rocky plains of eastern Himalayas entering Arunachal Pradesh, India. The length of this huge river is 445 kilometers. The river further flows ahead to Assam merging with the Brahmaputra River at Majuli.
Option c is incorrect: Myntdu River of Meghalaya is among the chief rivers in the District Jaintia Hills. The local name of this river is 'ka Tawiar ka Takan' meaning 'Our Guardian Angel'. The Myntdu River originates at Mihmyntdu, a place very close to Jowai town. The Myntdu River is often described as the guardian and protector of the inhabitants of Jowai region.

Option d is incorrect: Feni River, also known as Feni Nodi is Bengali, is an Indian river present in the state of Tripura which meets the south-eastern border of Bangladesh. The origin of Feni River is from the southern Tripura District that passes through Sabroom town and finally it enters into a state of Bangladesh.

Q.83)

Ans) c

Exp) Option c is the correct answer.

Statement 1 is correct: Paleomagnetism is the study of magnetic rocks and sediments to record the history of the magnetic field. Some rocks and materials contain minerals that respond to the magnetic field. So, when rocks form, the minerals align with the magnetic field preserving its position. It's called rock magnetism when rocks record the position of the magnetic field. The magnetic signature of the rocks allows paleomagnetic to date the rocks and map the position of the field at the time of their formation.

Statement 2 is correct: Paleomagnetic studies of the different continental blocks contributed to the rejuvenation of the continental drift hypothesis. Scientists using palaeomagnetic data have determined the positions held by each of the present continental landmasses in different geological periods. Position of the Indian subcontinent (mostly Peninsular India) is traced with the help of the rocks analysed from the Nagpur area.

Q.84)

Ans) b

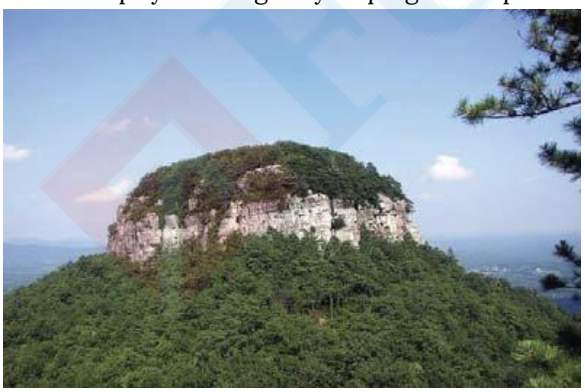
Exp) Option b is the correct answer.

The Wind or Eolian erosion takes place in the following ways such as deflation and abrasion.

Deflation is the process of removing, lifting and carrying away dry particles by wind resulting in the creation of depression in soils. Abrasion happens when wind loaded with sand grains erodes the rock by grinding against its walls.

Option a is incorrect: A table shaped rock formed due to the differential rate of erosion of hard and soft rocks by Wind is called Zeugen.

Option b is correct: Small Mountain that rises abruptly from the surrounding plain due to the action of wind is called Inselberg. Inselberg (also known as a monadnock) is an isolated hill or small mountain that rises abruptly from a gently sloping or flat plain.



Option c is incorrect: Depression formed in the soil due to removal of loose and fine-grained particles by wind is called deflation basis.

Option d is incorrect: A large hole shaped rock due to the action of strong blown wind on rocks results in the creation of window rocks as hole formed expands to reach the other side of the rock.

Q.85)
Ans) a
Exp) Option a is the correct answer.
Antipatharians, also known as black corals or thorn corals, are an order of soft deep-water corals.
Statement 1 is incorrect: Black corals are rarely black, but rather vary in color from white to red, green, yellow, or brown. They also range in shape from small bushes to bottle brushes to fans to single stalks. They get their name because of their black skeleton.
Statement 2 is correct: The black corals do not have symbiotic algae associated with them, and they do not require light which enables them to extend into depths where light is not present.
Statement 3 is incorrect: Black corals are found from shallow to deep ocean depths. Some species of antipatharians can be found living at depths of only a few meters and others as deep as 8600 m, but most occur at depths ranging from about 20 to 1000 m. Antipatharians are exclusively marine and are found in all oceans from the Arctic to the Antarctic.

Q.86)
Ans) c
Exp) Option c is the correct answer.
Statement 1 is incorrect: Ocean acidification leads to increase in the concentration of carbonic acid, bicarbonate ions and hydrogen ions. It leads to decrease in the concentration of carbonate ions.
Statement 2 is incorrect: Saturation horizon of calcium carbonate is level below which calcium carbonate minerals undergo dissolution. Due to ocean acidification this horizon rises vertically in the water column. This leads more exposure of calcifying organisms to under saturated water.

Q.87)
Ans) c
Exp) Option c is the correct answer.
The Patkai Bum, Naga Hills, Manipur Hills, Lushai Hills are part of the Himalayan Mountain system having their general alignment from the north to the south direction. Their elevation decreases from North to South.
Patkai Bum forms the border between Arunachal Pradesh and Myanmar. (Thus, northernmost among the hills in the option)
Naga Hills form watershed between India and Myanmar. Mt. Sharamati is the highest peak of these hills. (Thus, just after Patkai Bum)
Manipur Hills form border between Manipur and Myanmar (After the Naga Hills)
Mizo Hills (Lushai Hills) has Blue Mountain as the Highest peak. (Southernmost among the hills in the option)

Q.88)
Ans) c
Exp) Option c is the correct answer.
Statement 1 is correct – Permafrost is a ground that remains completely frozen at 0 degrees Celsius or below for at least two years. It is defined solely based on temperature and duration.
Statement 2 is correct – Beneath its surface, permafrost contains large quantities of organic leftover from thousands of years prior – dead remains of plants, animals, and microorganisms that got frozen before they could rot. It also holds a massive trove of pathogens.
Statement 3 is incorrect - These grounds are known to be below 22 per cent of the land surface on Earth, mostly in polar zones and regions with high mountains. They are spread across 55 per cent of the landmass in Russia and Canada, 85 per cent in the US state of Alaska, and possibly the entirety of

Antarctica. At lower latitudes, permafrost is found at high altitude locations such as the Alps and the Tibetan plateau. Thus, in the Northern Hemisphere, Permafrost is not confined to higher latitudes only.
Statement 4 is correct - When permafrost thaws, microbes start decomposing this carbon matter, releasing greenhouse gases like methane and carbon dioxide. Researchers have estimated that for every 1-degree Celsius rise in average temperature, permafrost regions could release greenhouse gases to the tune of 4-6 years of emissions from coal, oil, and natural gas – becoming a major factor of climate change in themselves.

Q.89)
Ans) c
Exp) Option c is the correct answer.
Red Sea is the world's northernmost tropical sea and at the northern end, it separates into the Gulf of Aqaba and the Gulf of Suez, which is connected to the Mediterranean Sea via the Suez Canal. At the southern end, it is connected to the Gulf of Aden, and the outer Indian Ocean, via the Strait of Bab-el-Mandeb.

A total of 6 countries of Asia and Africa, border the Red Sea. The countries of Yemen and Saudi Arabia border the Red Sea to the east. The Red Sea is bordered by Egypt to the north and west, and by Sudan, Eritrea, and Djibouti to the west.

Q.90)
Ans) c
Exp) Option c is the correct answer.
Assam, stretching across the Brahmaputra valley and surrounded by garlands of hills is the land of the 'Red river and blue hills'. The red refers to another name of the mighty Brahmaputra – Lauhitya (Luit as the Assamese fondly call it) and the blue from the hills simmering in the distance creating a blue haze.
A significant geographical aspect of Assam is that it contains three of six physiographic divisions of India –The Northern Himalayas (Eastern Hills), The Northern Plains (Brahmaputra plain), and the Deccan Plateau (Karbi Anglong).
Assam shares about 2.4 % of the country's total geographical area and provides shelter to 2.6 % population of the country.

Q.91)

Ans) c

Exp) Option c is the correct answer.

Tomatoes are a warm season crop and require at least 6-8 hours of direct sunlight per day for optimal growth and fruit production. Tomato can be grown on a wide range of soils from sandy to heavy clay. However, well-drained, sandy or red loam soils rich in organic matter with a pH range of 6.0-7.0 are considered ideal. The plants cannot withstand frost and high humidity. It is usually cultivated in sub-tropical and mild cold climatic regions. It thrives well in temperatures of 100C to 300C with an optimum range of temperature is 21-240C. Temperatures above 32o C adversely affect the fruit set and development. Tomatoes require approximately 1-2 inches (2.5-5 cm) of water per week, depending on weather conditions and soil type. Overwatering can however lead to issues such as root rot, fungal diseases, and reduced fruit quality.

Statement a is incorrect: Banana, basically a tropical crop, grows well in a temperature range of 15°C – 35°C with relative humidity of 75-85%. Deep, rich loamy soil with pH between 6.5 – 7.5 is most preferred for banana cultivation.

Statement b is incorrect: Guava tolerates high temperatures and drought conditions prevalent in north India in summers. However, it is susceptible to severe frost as it can kill the young plants. Heavy clay to very light sandy soils having pH between 4.5-8.2 are suitable for cultivation of guava.

Statement d is incorrect: An annual rainfall of 100-120 cm. and temperature ranging from 10-350 C is suitable for cultivation of the orange crop. Oranges can be grown in a wide variety of soils but medium or light loamy soils with slightly heavy sub-soil, well-drained with pH of 6.0-8.0 are ideal for cultivation.

Q.92)

Ans) b

Exp) Option b is the correct answer.

Landslides may be caused by natural factors such as heavy rain, snowfall, earthquake, or it may be induced by human factors like over-interference with the slope-stability by deforestation, unplanned construction, or mining.

Statement 1 and 4 are correct: Isostatic Equilibrium means that the Earth's surface is in equilibrium when the buoyancy force of the mantle, pushing up on the lithosphere, is equal to the gravitational force pushing down on it. Himalayas have relatively younger age and has not thus achieved the Isostatic Equilibrium which frequently causes the landslides.

Statement 2 is correct: Diurnal changes of temperature are much more in northern India. This weakens the rocks and aids mass wasting causing landslides.

Statement 3 is incorrect: Himalayas are made of sedimentary, igneous as well as meta-morphic rocks. Among these Sedimentary rocks majorly contribute to the occurrence of landslides in the Himalayas. These rocks are more susceptible to denudation and erosion and thus can cause landslides. Also, igneous rocks are hard and are not very susceptible to erosion.

Q.93)

Ans) c

Exp) Option c is the correct answer.

Pair 1 is correct: The Canaries cold current flowing along the north-west coast of Africa is the reason for the formation of the Sahara Desert in Western African regions. Presence of the Canaries along Northwest Africa caused rainless conditions in the coastal region of Africa and led to the formation of the Sahara Desert.

Pair 2 is correct: The Namib Desert is a desert in South Africa, and it is a direct result of the Benguela cold current flowing along the west coast of South Africa.

Pair 3 is correct: The Atacama Desert is located in the Pacific coast of South America and caused due to the presence of Humboldt cold current (also known as Peruvian Current) along the west coast of South America.
Pair 4 is incorrect: The Mojave Desert located in the Southwestern USA is not formed due to Oyashio cold current flowing along the coast of Japan. Rather Mojave Desert is the direct result of California Cold Current following near the region of Mojave Desert.

Q.94)
Ans) a
Exp) Option a is the correct answer.
The air around has weight, and it presses against everything it touches. That pressure is called atmospheric pressure, or air pressure. It is the force exerted on a surface by the air above it as gravity pulls it to Earth.
Statement 1 is incorrect: There is low atmospheric pressure over the equator and high at polar region. As equatorial region is hotter and the air above it expands, becomes less dense and rises. This produces a low-pressure belt at equator. While at the poles, as the temperature is low, atmospheric pressure will be high. At the north and south polar regions, we have the polar high-pressure belts.
Statement 2 is incorrect: Air pressure has a proportional relationship with gravity. Atmospheric pressure is the force exerted on a surface by the air above it as gravity pulls it to Earth. With increasing altitude, the air pressure decreases as gravity effect of earth reduces. Hence, atmospheric pressure is not independent of gravity.
Statement 3 is correct: Atmospheric pressure decrease with altitude. Boiling point is a temperature at which the pressure exerted by the surroundings upon a liquid is equalled by the pressure exerted by the vapours of the liquid. As a result, water at high elevations boils at a lower temperature (because of low atmospheric pressure at higher altitudes). It takes less energy to raise water to the boiling point when air pressure is lower. Because there is less energy and thus less heat at a higher altitude, water will boil at a lower temperature. Thus, air pressure rises, the boiling point of the liquid rises, and as atmospheric pressure falls, the boiling point of the liquid falls. Hence, Atmospheric pressure lowers the boiling point of water at higher altitude.

Q.95)
Ans) c
Exp) Option c is the correct answer.
Indian Monsoon can be impacted majorly through following geographical phenomenon:
• Easterly Jet Stream
• ENSO (El-Nino Southern Oscillation)
• Indian Ocean Dipole
• Madden Julian Oscillation
• Subtropical Westerly jet stream.
Agulhas is a warm current that flows along the coastline of South Africa.

Q.96)
Ans) a
Exp) Option a is the correct answer.
Brinjal, Jackfruit and Ginger are known to be native to Indian subcontinent.
• The potato is native to the Peruvian-Bolivian Andes. It was cultivated in South America by the Incas as early as 1,800 years ago.

• Chili peppers originated in Bolivia and were first cultivated in Mexico. After the Columbian Exchange, many cultivars of chili pepper spread around the world, used for both food and traditional medicine.
• Bell peppers originated in Mexico, Central America, and South America. Peppers were named by Christopher Columbus and Spanish explorers who were searching for peppercorn plants to produce black pepper. Columbus took samples of a wide variety of peppers back to Europe where they became quite popular.

Q.97)
Ans) b
Exp) Option b is the correct answer.
Seismic waves are waves of energy that travel through the Earth's layers and are a result of earthquakes, volcanic eruptions, magma movement, large landslides and large human-made explosions.
Statement 1 is incorrect: Primary waves (P-Waves) are called so because they are the fastest among the seismic waves and hence are recorded first on the seismograph. These waves are of relatively high frequency and are the least destructive (not most) among the earthquake waves.
Statement 2 is correct: Earthquake waves get recorded in seismographs located at far off locations. However, there exist some specific areas where the waves are not reported. Such a zone is called the 'shadow zone'. The shadow zone of P-waves appears as a band around the earth between 105° and 145° away from the epicentre. The shadow zone of S-waves is not only larger in extent but it is also a little over 40 per cent of the earth surface.

Q.98)
Ans) a
Exp) Option a is the correct answer.
The Atlantic Meridional Overturning Circulation (AMOC) is a large system of ocean currents which are Thermohaline (driven by differences in temperature and salinity). It is responsible for distributing heat and nutrients between the Poles and the Tropics.
AMOC carries warm surface waters from the tropics towards the Northern Hemisphere, where it cools and sinks. It then returns to the tropics and then to the South Atlantic as a bottom current. From there it is distributed to all ocean basins via the Antarctic circumpolar current.
A recent report by the IPCC (AR6) has said that the AMOC is at its weakest in centuries and will weaken more by the end of the 21st century.
Statement a is correct: Since AMOC is one of the prime driving forces underpinning the Gulf Stream which reaches Northwest Europe as the warm North Atlantic Drift, a weakened AMOC will lead to colder winters for Northern Europe. The coasts may not remain ice free yearlong, disrupting shipping and fishing businesses, and increased energy costs due to increased need for heating.
Statement b is incorrect: Since Northern Europe will remain much colder with induced upwelling of cold water, the onshore winds will have insufficient moisture (cold air carries lesser moisture). The rain belt will shift south towards the tropics, as there will be reduced redistribution of heat. This will lead to reduced rains and increased droughts in Europe as well as the Sahel (transition zone between the Sahara and Sudanian Savanna) region of Africa.
Statement c is incorrect: A 2016 paper in Science Advances noted: "AMOC collapse brings about large, markedly different climate responses:
1. a prominent cooling over the northern North Atlantic and neighbouring areas,
2. sea ice increases over the Greenland-Iceland-Norwegian seas and to the south of Greenland, and
3. a significant southward rain-belt migration over the tropical Atlantic."

Statement d is incorrect: Since the weakened AMOC cannot distribute the warm waters of the Gulf Stream across the Atlantic, it leads to a piling up of water along the eastern coast of America along which the Gulf Stream flows. This leads to a rise in the level of seawater along the eastern coast of America.

Q.99)

Ans) c

Exp) Option c is the correct answer.

Statement 1 is incorrect. Earth's Geomagnetism is not caused by a giant bar magnet placed along the axis of rotation of the earth and deep in the interior.

Statement 2 is correct. Earth's magnetic field is generated in the earth's outer core. The Earth consists of a solid iron core. Surrounding the iron core is an ocean of hot, liquid metal. The liquid metal that flows in Earth's core creates electrical currents, which in turn creates our magnetic field.

Statement 3 is correct. The Earth's magnetic field plays an important role in protecting the planet from solar winds and cosmic radiation that are harmful.

Statement 4 is incorrect. Mars doesn't have flowing liquid metal in its core and thus it doesn't produce the same dynamo effect. This leaves the planet with a very weak magnetic field, allowing for its atmosphere to be stripped away by solar winds, leaving it uninhabitable. Similarly, the moon also has no molten core thus has no magnetic field.

Statement 5 is correct. According to British Geological Survey, the earth's magnetic north pole is moving from its current position in Canada towards Siberia.

Q.100)

Ans) b

Exp) Option b is the correct answer.

Statement 1 is correct – Every year in winter, strong westerly winds circle the pole high up in the stratosphere. This is called the stratospheric polar vortex and it circulates cold air high over the Arctic.

In some years, the winds in the polar vortex temporarily weaken. The cold air then descends very rapidly in the polar vortex and this causes the temperature in the stratosphere to rise very rapidly, as much as 50 °C over only a few days; hence the term sudden stratospheric warming.

Statement 2 is correct – As the cold air from high up in the stratosphere disperses, it can affect the shape of the jet stream as the cold air sinks from the stratosphere into the troposphere. It is this change in the jet stream that causes our weather to change.

Statement 3 is incorrect– Extreme cold, winter snow events have all been connected to the surface effects of sudden stratospheric warming. Eg. Extreme cold events in the year 2009-10, 2013 as well as 'beast from the east' in 2018.