**Q.1) Consider the following statements:**

1. Groundwater hosts more water than lakes and rivers combined.
2. Deep-sea trenches are formed at the continent margin.
3. Eastern coast of North America has wider continental shelf than coast of Chile.

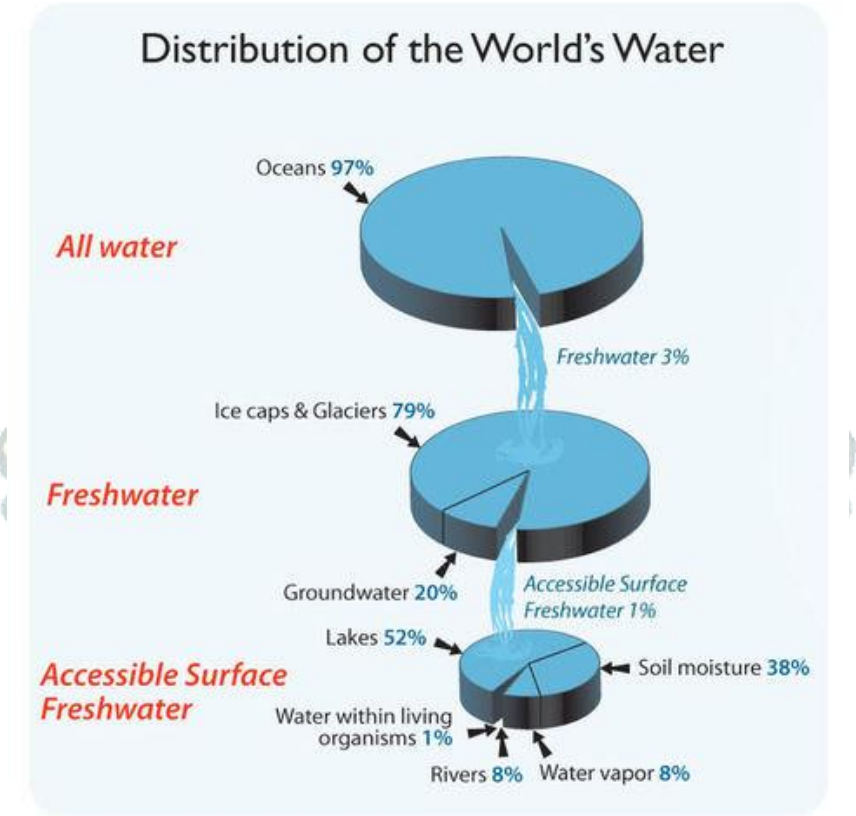
**Which of the above statements is/are correct?**

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

**Q.1) Solution (d)**

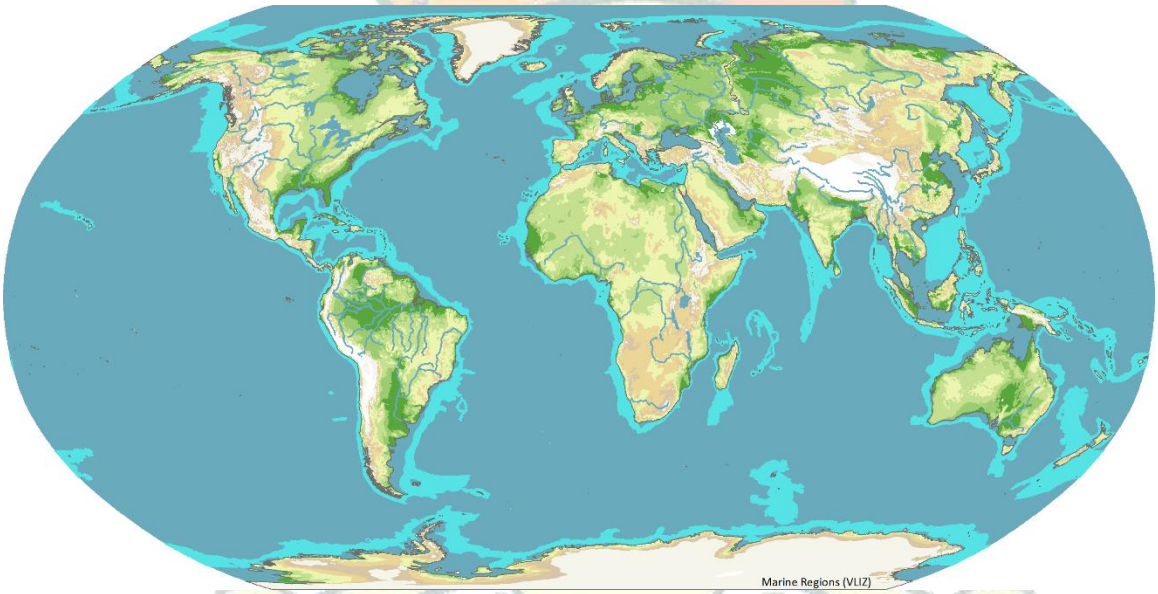
**Basic Information:**

**Earth's water distribution:**



**Continental shelf:**

- The continental shelf is the extended margin of each continent occupied by relatively shallow seas and gulfs. It is the shallowest part of the ocean showing an average gradient of 1° or even less.
- The shelf typically ends at a very steep slope, called the **shelf break**.
- The width of the continental shelves varies from one ocean to another. The average width of continental shelves is about 80 km.
- The shelves are **almost absent or very narrow** along some of the margins like the **coasts of Chile,** the **west coast of Sumatra**, etc. On the contrary, the Siberian shelf in the Arctic Ocean, the largest in the world, stretches to 1,500 km in width.




**Statement Analysis:**

| Statement 1 | Statement 2 | Statement 3 |
|---|---|---|
| **Correct** | **Correct** | **Correct** |
| Surface water (lakes, rivers etc.) constitutes not more than 1% of the total freshwater. | When the oceanic crust is subducted under continental crust along with the continental-oceanic crusts convergent boundary | The shelves are **almost absent or very narrow** along some of the margins like the **coasts of Chile,** the |

| | | |
|---|---|---|
| Whereas groundwater constitutes more than 20%. | (the continent margin abyssal plain boundary), deep-sea trenches are formed. | **west coast of Sumatra etc.** |

**Q.2) The phenomenon of "Ekman Transport" is related with?**

a) Ocean Deposits
b) Waves
c) Tides
d) Ocean Currents

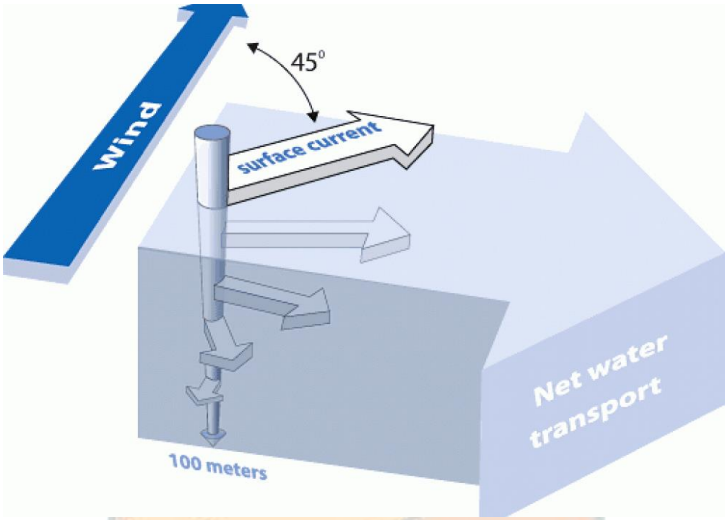
**Q.2) Solution (d)**

**Explanation:**

**Ekman Spiral/Ekman Transport** is the result of **Coriolis force** on the movement of surface water. The wind-stress moves the uppermost layer of water. This layer, in turn, drags the layer below it. Each deeper layer moves more slowly than the layer above it until the movement ceases at a depth of about 100 meters.

All layers of water are deflected by Coriolis force to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. As a result, each successive layer moves 45 degrees to the direction of drag force being applied. This creates a **twisting effect** creating the **spiral**. The spiral is known as Ekman Spiral and each subsequent layer is called the Ekman Layer.

The average movement of all the layers comes out to be 90 degrees to the direction of the surface wind.




Ekman Spiral gives rise to '**Gyres**'. These are **ocean-circling currents** that occur north and south of the equator.

**Q.3) With reference to "Submarine Canyons", consider the following statements:**

1. Submarine canyons are formed via erosion and mass wasting events.
2. A submarine canyon can extend up to the mouth of the rivers.
3. Due to turbidity current they are devoid of primary productivity.

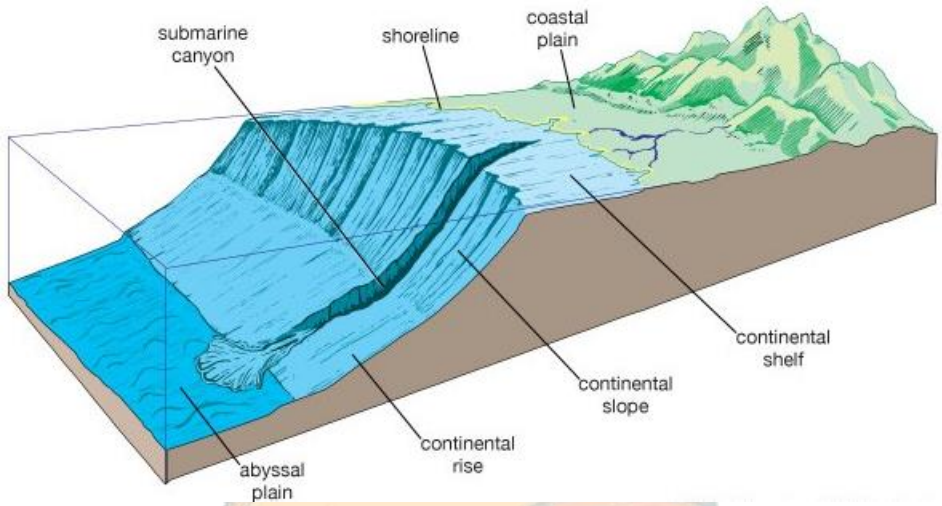
**Which of the above statements is/are correct?**

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

**Q.3) Solution (a)**

**Basic Information:**

## Submarine canyons:




- Submarine canyons are formed via **erosion** and mass **wasting events**, particularly on steep continental slopes but also on the flanks of volcanic islands.
- Canyons serve as conduits for terrigenous (land-derived) sediment derived from the continents to the deep ocean basins.
- Many of the world's largest submarine canyons commence on the **continental shelf**, and sometimes at the **mouths of large rivers or glaciers**, and are incised into the continental slope.
- Oceanographically, canyons may affect local upwelling patterns and **enhanced primary productivity** which extends up the food chain to include birds and mammals.
- Consequently, commercially important pelagic and demersal fisheries as well as cetacean feeding grounds are commonly located at the heads of submarine canyons.

**Statement Analysis:**

| Statement 1 | Statement 2 | Statement 3 |
|---|---|---|
| Correct | Correct | Incorrect |
| Submarine canyons are formed via **erosion** and mass **wasting events**, particularly on steep continental slopes but also on the flanks of volcanic islands. | A submarine canyon is a steep-sided valley of the oceans.<br><br>They cut into the seabed of the continental slope, sometimes extending well onto the continental shelf, **up to the mouth of the** | The driving force behind the **enhanced productivity** is the **upwelling** and **mixing of cold, nutrient-rich waters** affected by canyon geomorphology interacting with ocean currents and internal waves. |

| | | |
|---|---|---|
| | **rivers**. | |

**Q.4) With respect to the ocean deposits consider the following statements:**

1. Red clay is the most abundant of deep water deposits.
2. Calcareous biological ooze is found above carbon compensation depth.

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

a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 and 2

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

**Basic Information:**

**Biogenous deposits –** They include the organic deposits received from the dead animals and fishes. It also includes the shells and waste released by marine plants. In order to be categorized as organic particles, they should retain atleast 30% of their organic content.

**The oozes-** The biological deposits of oceans are called Oozes.

- Made of - shelly and skeletal remains of marine organism
- They have very fine, flour like texture and occur as accumulated deposits or float about in suspension.

**They can be of two types –**

- **Calcareous Oozes –** They have **high quantity of calcium**. Calcareous oozes may be divided based on the type of organism present in the sedimentary deposition. They are called Globigerina and pteropod.
- **Siliceous Oozes –** They have high quantity of silicon and found beyond 2500 m. Siliceous oozes comprise two forms, including diatom ooze and radiolarian ooze.

**Red clay**

They are one of the finest deposits found on the ocean floor.

- Occur as red clay in deep oceanic basin. (abundant in Pacific Ocean)
- These are believed as volcanic dust blown out from volcanoes during volcanic eruptions.

**Statement Analysis:**

| Statement 1 | Statement 2 |
|---|---|
| **Correct** | **Correct** |
| Red clay are most abundant of deep water deposits almost 30-40%.<br><br>Red clay comprises the most widely distributed specific pelagic deposit and covers more than half of the total ocean floor in the Pacific Ocean. | Calcareous biological ooze is found above carbon compensation depth since deeper water contains more carbon dioxide leading to calcium carbonate dissolution. |

**Q.5) With reference to "Marine Heat Wave", consider the following statements:**

1. Marine heat waves occur only in summer.
2. Marine heat wave is unique to Pacific Ocean.
3. The most common drivers of marine heat waves include ocean and air-sea heat flux.
4. It always negatively affects ecosystem structure.

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

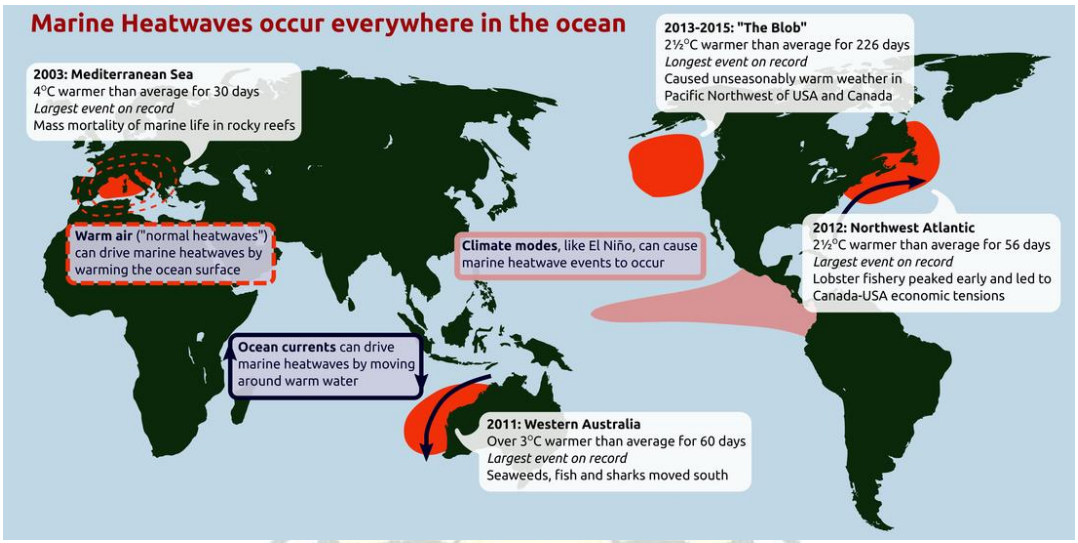
a) 1, 3 and 4 only
b) 3 only
c) 2 and 4 only
d) 3 and 4

**Q.5) Solution (b)**

**Basic Information:**

- We know that heatwaves occur in the atmosphere. We are all familiar with these extended periods of excessively hot weather. However, heatwaves can also occur in the ocean and these are known as **marine heatwaves,** or **MHWs**.

- These marine heatwaves, when ocean temperatures are extremely warm for an extended period of time can have significant impacts on marine ecosystems and industries. **Marine heatwaves can occur in summer or winter** - they are defined based on differences with expected temperatures for the location and time of year.




**Statement Analysis:**

| Statement 1 | Statement 2 | Statement 3 | Statement 4 |
|---|---|---|---|
| Incorrect | Incorrect | Correct | Incorrect |
| Heatwaves can happen in summer and also in winter, where they are known as "**winter warm-spells**". | They occur everywhere in the ocean.<br>Refer the figure given above. | Marine heatwaves can be caused by a whole range of factors, and not all factors are important for each event. The most common drivers of marine heatwaves include ocean currents which can build up areas of warm water and air-sea heat flux, or warming through the ocean surface from the atmosphere. | Marine heatwaves affect ecosystem structure, by **supporting certain species** and **suppressing others.**<br>Marine heatwaves can change the habitat ranges of certain species, such as the spiny sea urchin off southeastern Australia which has been expanding southward into |

| | | | |
|---|---|---|---|
| | | | Tasmania at the expense of kelp forests which it feeds upon. |

**Q.6) Consider the following statements about abyssal plains:**

1. Abyssal plains are flat featureless plains.
2. Fine to coarse grain sediments are deposited on the abyssal plains.

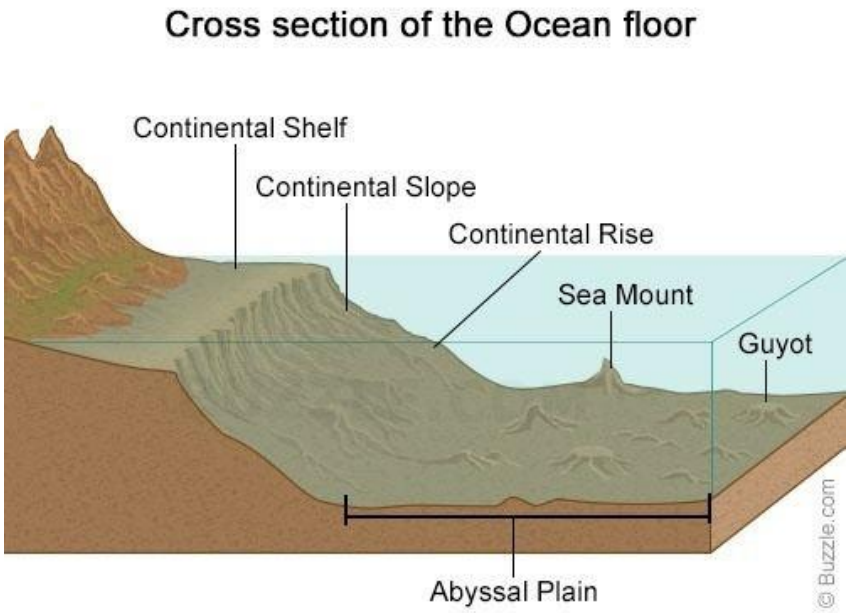
**Which of the following statements is/are correct?**

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

**Q.6) Solution (b)**

**Basic Information:**

- At depths of over 10,000 feet and covering 70% of the ocean floor, abyssal plains are the largest habitat on earth.
- The plains are thought to be the upper surfaces of land-derived sediment that accumulates in abyssal depressions, thus smoothing out a preexisting hilly or otherwise irregular topography.




- Sediment from the continental margins accretes at steep continental slopes, and occasional submarine slumping of this coarse material creates dense, sediment-laden slurries, called turbidity currents, that flow down the slopes in obedience to gravity. Part of the turbidity-current sediment settles out at the bases of the continental slopes, creating continental rises of lesser gradient, but some of the coarse sediment reaches the abyssal depressions. Horizontal silty, sandy, and even gravelly beds that are fractions of a centimetre to several metres thick comprise 2 to 90 percent of abyssal-plain sediment. Many such layers demonstrably are of shallow-water organisms.
- The coarse layers are interbedded with homogeneous deposits of fine-grained clay and the microscopic remains of organisms that inhabit the waters overlying the abyssal plains.

**Statement Analysis:**

| Statement 1 | Statement 2 |
|---|---|
| **Incorrect** | **Correct** |
| Abyssal plains have undulating topography with occasional seamounts, guyots, sea knolls, etc. | Abyssal plains have sediments overlain over them. |

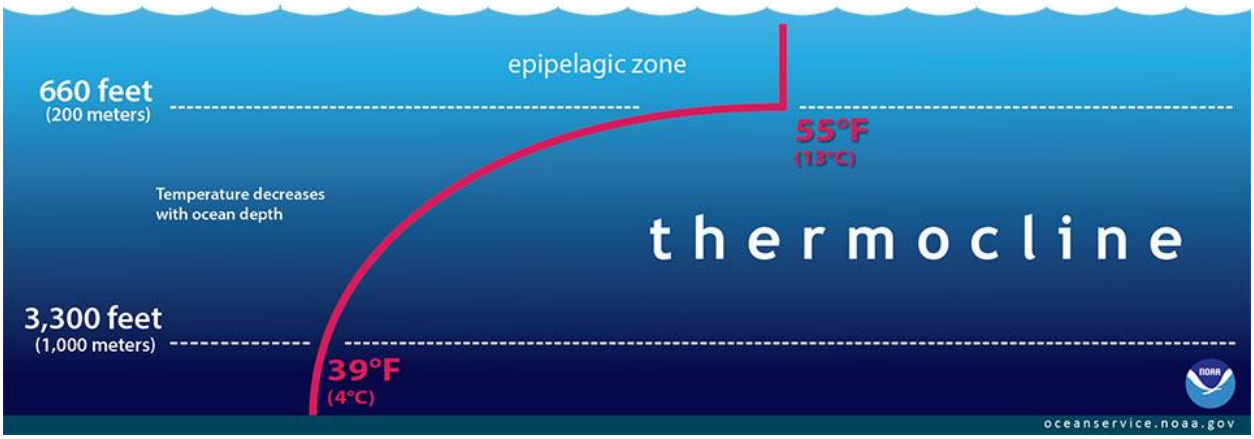
**Q.7) Select the incorrect statement with respect to thermoclines:**

a) It is a boundary region between the surface waters of the ocean and the deeper layers.
b) The boundary usually begins around 100 – 400 m below the sea surface and extends few meters downward.
c) It is a zone of steep temperature gradient.
d) Thermoclines are least developed in the upwelling zones.

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

**Basic Information:**

- A thermocline is the transition layer between warmer mixed water at the ocean's surface and cooler deep water below.
- A thermocline is the transition layer between the warmer mixed water at the surface and the cooler deep water below. It is relatively easy to tell when you have reached the thermocline in a body of water because there is a sudden change in temperature
- The boundary usually begins around 100 – 400 m below the sea surface and extends **several hundred of meters** downward.
- Thermoclines also play a role in meteorological forecasting. For example, hurricane forecasters must consider not just the temperature of the ocean's skin (the sea surface temperature), but also the depth of warm water above the thermocline. Water vapor evaporated from the ocean is a hurricane's primary fuel. The depth of the thermocline is the measure of the size of the "fuel tank" and helps to predict the risk of hurricane formation.




**Q.8) Consider the following statements about waves:**

1. Surface waves, are formed due to the friction between surface water and wind.
2. Waves can be created by the gravitational pull of the sun and moon.
3. The breaking of water of surface waves can happen anywhere on the surface of the seawater.
4. Seiche waves are a type of standing waves.

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

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

**Q.8) Solution (d)**

**Basic Information:**

- The most common cause of ocean waves is wind. Wind-driven waves, also known as surface waves, are formed due to the friction between surface water and wind.
- The breaking waves are formed when the wave collapses on top of itself. The breaking of water surface waves happens anywhere on the surface of the seawater.
- Tidal waves are caused due to astronomical forces like the gravitational pull of the sun and the moon on the ocean water. You can think of the high and low tides as the traversing of a wave with a time period of 12 hours.
- Seiche waves or simple a seiche (pronounced 'saysh') are standing waves that form in a confined or partially confined body of water. Standing waves, in general, can form in any type of semi-enclosed or enclosed body of water.

**Statement Analysis:**

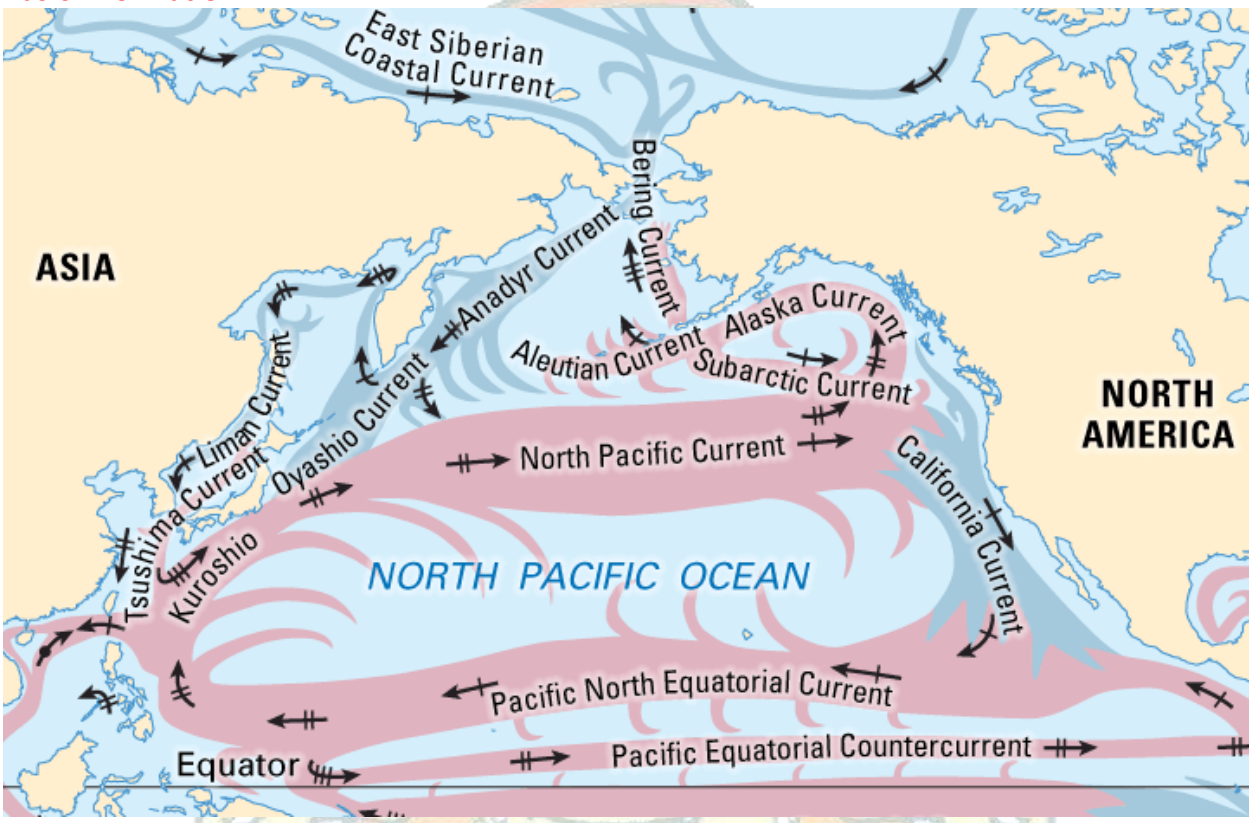
| Statement 1 | Statement 2 | Statement 3 | Statement 4 |
|---|---|---|---|
| Correct | Correct | Correct | Correct |
| Friction causes water to move. | These are tidal waves. | Waves can collapse anywhere. | In standing waves each points oscillates in its respective amplitude in a periodic manner. |

**Q.9) Select the incorrect statement from below given options:**

a) Oyashio current is a warm ocean current.
b) Anadyr current is a cold ocean current.
c) Alaska current is a warm ocean current.
d) California current is cold water current.

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

**Basic Information:**




**Q.10) Consider the following statements about coral reefs:**

1. Coral reefs help in shoreline protection.
2. Coral reefs are also found in the upwelling zones.
3. Coral reefs are largely absent on the eastern coast of India.

**Which of the following statement is/are *incorrect*?**

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

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

- A coral reef is an underwater ecosystem characterized by reef-building corals. Reefs are formed of colonies of coral polyps held together by calcium carbonate. Most coral reefs are built from stony corals, whose polyps cluster in groups.
- Sometimes called rainforests of the sea, shallow coral reefs form some of Earth's most diverse ecosystems. They occupy less than 0.1% of the world's ocean area, about half the area of France, yet they provide a home for at least 25% of all marine species.
- Coral reefs are estimated to cover 284,300 $km^2$, just under 0.1% of the oceans' surface area. The Indo-Pacific region (including the Red Sea, Indian Ocean, Southeast Asia and the Pacific) account for 91.9% of this total. Southeast Asia accounts for 32.3% of that figure, while the Pacific including Australia accounts for 40.8%. Atlantic and Caribbean coral reefs account for 7.6%.
- Deep-water coral inhabits greater depths and colder temperatures at much higher latitudes, as far north as Norway. Although deep water corals can form reefs, little is known about them.
- Coral reefs are rare along the west coasts of the Americas and Africa, due primarily to upwelling and strong cold coastal currents that reduce water temperatures in these areas (the Peru, Benguela and Canary Currents respectively).
- Corals are seldom found along the coastline of South Asia—from the eastern tip of India (Chennai) to the Bangladesh and Myanmar borders—as well as along the coasts of northeastern South America and Bangladesh, due to the freshwater release from the Amazon and Ganges Rivers respectively.

**Statement Analysis:**

*Note: incorrect statements are asked.*

| Statement 1 | Statement 2 | Statement 3 |
|---|---|---|
| **Correct** | **Incorrect** | **Correct** |
| Corals help in breaking the wave, thus protecting the shoreline. | Corals are not found in the upwelling zones. | Excessive mixing of freshwater. |

**Q.11) Which of the following lakes given below is/are manmade?**

1. Bhojtal
2. Gobind Sagar
3. Bhimtal Lake

**Select the correct option:**

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

**Q.11) Solution (d)**

**Basic Information:**

- Bhojtal Lake is a huge and magnificent body of water located in Madhya Pradesh and is a spectacular sight. Lying on the western side of Bhopal. It is a man made lake.
- About half an hour ride from Naina Devi, this amazing lake is a part of Bhakra Dam in Bilaspur and is astoundingly large in size. This is the ideal lake to visit if you are interested in rowing or boat riding. Naina Devi and the Bhakra Dam are two places nearby that are also popular destinations of Himachal.
- Bhimtal Lake is a lake in the town of Bhimtal, in the Indian state of Uttarakhand, with a masonry dam built in 1883 creating the storage facility. It is the largest lake in Kumaon region, known as the "lake district of India". The lake provides drinking water supply and supports aquaculture with variety of fish species.

**Q.12) Consider the following statements about artesian basins:**

1. An artesian basin is a low-lying region where groundwater is cramped under pressure.
2. The Great Artesian Basin is the largest and deepest artesian basin in the world which is located within Brazil.

**Which of the following statement(s) is/are *incorrect*?**

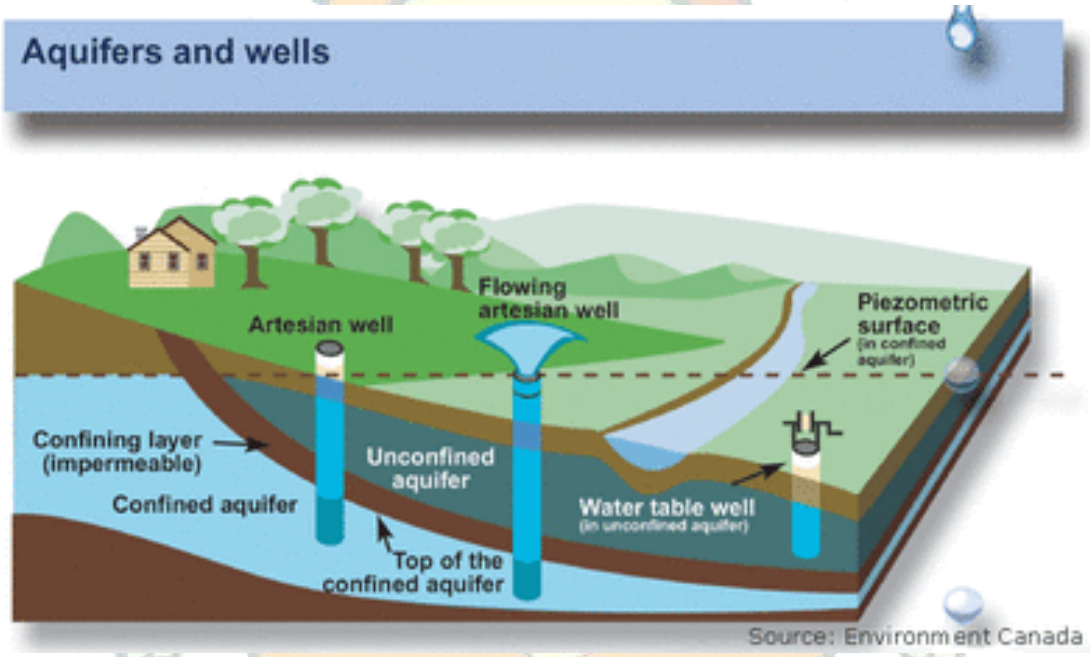
a) 1 only
b) 2 only

c) Both 1 and 2
d) Neither 1 nor 2

**Q.12) Solution (b)**

**Basic Information:**

- An artesian basin is a low-lying region where groundwater is cramped under pressure from surrounding layers of rock. These basins are usually found where an aquifer is present in a syncline, by impenetrable layers above as well as below. Whenever a fissure breaks open the surface, the underground water blows up. This results in the rising of the water level to a point where hydrostatic equilibrium has been achieved.
- A well drilled into this aquifer is known as an artesian well. If the water reaches the ground surface pressurized naturally by the aquifer, the well is known as a flowing artesian well. For an aquifer to be artesian, the water table must reach the surface.




- The Great Artesian Basin is the largest and deepest artesian basin in the world. It is located within Australia, stretching over 1,700,000 square kilometres, and is huge enough to fill Sydney Harbour 130,000 times.

**Statement Analysis:**

*Note: incorrect statements are asked.*

| Statement 1 | Statement 2 |
|---|---|
| Correct | Incorrect |

| | |
|---|---|
| This is how artesian basins are formed. | Great Artesian Basin is located in Australia. |

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

1. Siachen is the second longest glacier outside of the Polar Regions and largest in the Himalayas-Karakoram region.
2. Glacial retreat may form glacial lakes.
3. Global warming induced by the climate change is increasing the number of the glaciers.

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

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

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

**Basic Information:**

Glaciers are a bulk of ice moving under its weight. It forms in areas where the amassing of snow goes beyond its ablation over many years.

- They are generally seen in the snow-fields.
- This largest freshwater basin covers around 10 percent of the land surface of the Earth.
- According to the topography and the location of the glacier, it can be categorized as Mountain Glacier (Alpine Glaciers) or Continental Glacier (Ice Sheets).
- The Continental Glacier moves outward in all directions whereas the Mountain Glacier moves from a higher to a lower altitude.
- Siachen is the second longest glacier outside of the Polar Regions and largest in the Himalayas-Karakoram region. It is located in the UT of Ladakh.

According to NDMA, glacial retreat due to climate change has given rise to the formation of numerous new glacial lakes.

Due to the same reason the glaciers are getting fragmented and thus their number is increasing. However, their size is decreasing.

**Statement Analysis:**

| Statement 1 | Statement 2 | Statement 3 |
|---|---|---|
| **Correct** | **Correct** | **Correct** |
| It is a fact. | Glacial retreat due to climate change has given rise to the formation of new glacial lakes. | Fragmentation leads to increase in the number of glaciers. |

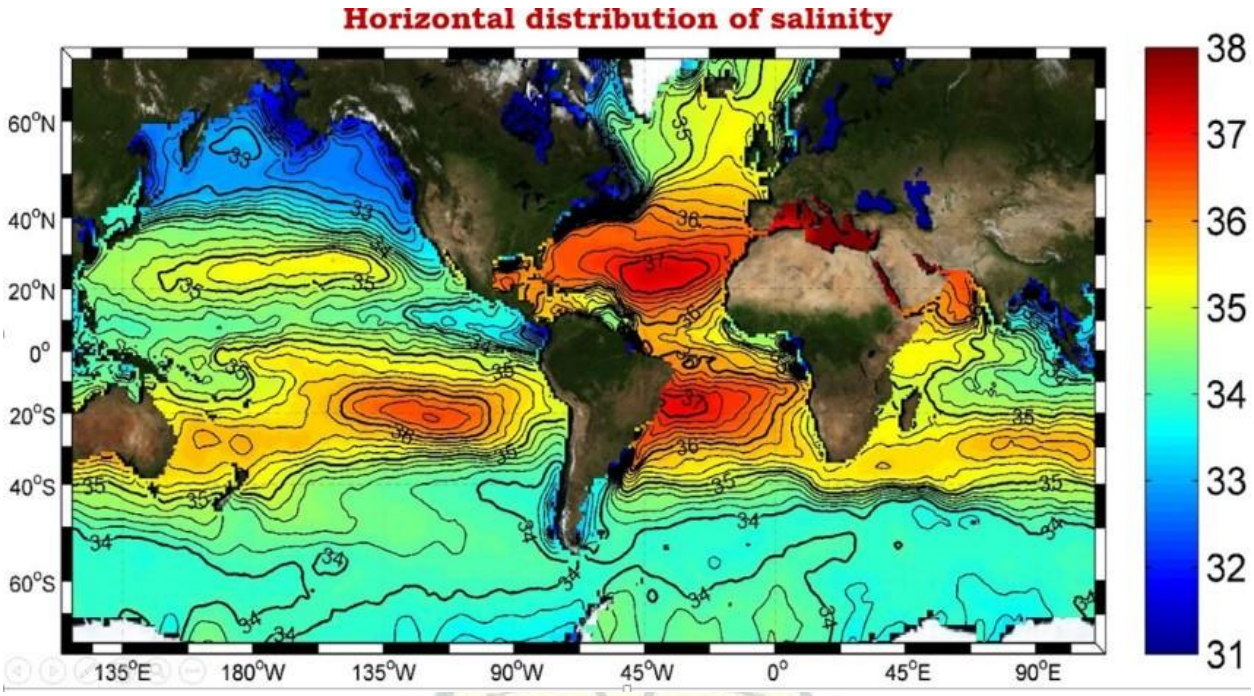
**Q.14) Which of the following statements about ocean salinity is *incorrect*?**

a) The North Sea, in spite of its location in higher latitudes, records higher salinity than other oceanic waters at same latitude.
b) The Mediterranean Sea records higher salinity due to high evaporation.
c) Arabian Sea shows lower salinity than Bay of Bengal.
d) Equatorial waters have less salinity than tropical waters.

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

**Basic Information:**

- The salinity of water in the surface layer of oceans depends mainly on evaporation and precipitation.
- Surface salinity is greatly influenced in coastal regions by the fresh water flow from rivers, and in Polar Regions by the processes of freezing and thawing of ice.
- Wind also influences salinity of an area by transferring water to other areas.
- The ocean currents contribute to the salinity variations.
- The equatorial region of the Atlantic Ocean has a salinity of about 35.
- Near the equator, there is heavy rainfall, high relative humidity, cloudiness and calm air of the doldrums.
- The polar areas experience very little evaporation and receive large amounts of fresh water from the melting of ice. This leads to low levels of salinity, ranging between 20 and 32.
- Maximum salinity (37) is observed between 20° N and 30° N
- Arabian Sea shows higher salinity due to high evaporation and low influx of fresh water.
- The Mediterranean Sea records higher salinity due to high evaporation.
- The North Sea, in spite of its location in higher latitudes, records higher salinity due to more saline water brought by the North Atlantic Drift.




**Q.15) Consider the following statements:**

1. Lake Titicaca is the highest navigable lake in the world.
2. Gaet'ale Pond located in Ethiopia is the saltiest water body on Earth.

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

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

**Q.15) Solution (c)**

**Basic Information:**

- The most saline water body in the world is the Gaet'ale Pond, located in the Danakil Depression in Afar, Ethiopia. The water of Gaet'ale Pond has a salinity of 43%, making it the saltiest water body on Earth; (i.e. 12 times as salty as ocean water).

- Lake Titicaca is a large, deep, freshwater lake in the Andes on the border of Bolivia and Peru, often called the "highest navigable lake" in the world. By volume of water and by surface area, it is the largest lake in South America.

**Q.16) With reference to "tides" consider the following statements:**

1. Zenith tide is formed where the tidal force of moon is maximum.
2. Solar bulges are 46% the size of lunar bulges.

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

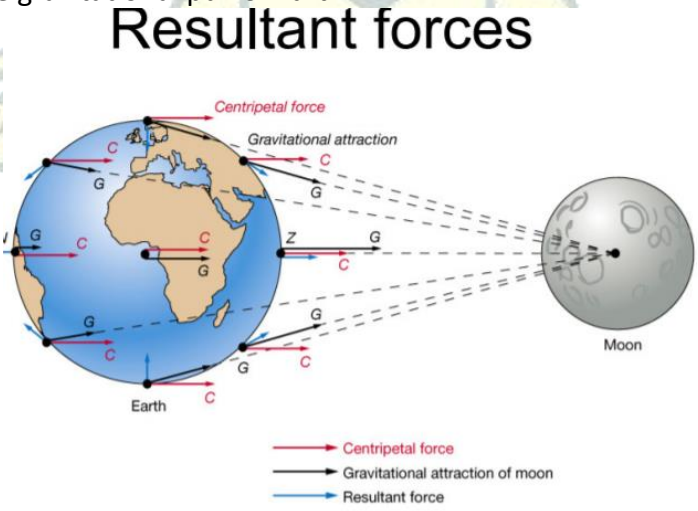
a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 and 2

**Q.16) Solution (c)**

**Basic Information:**

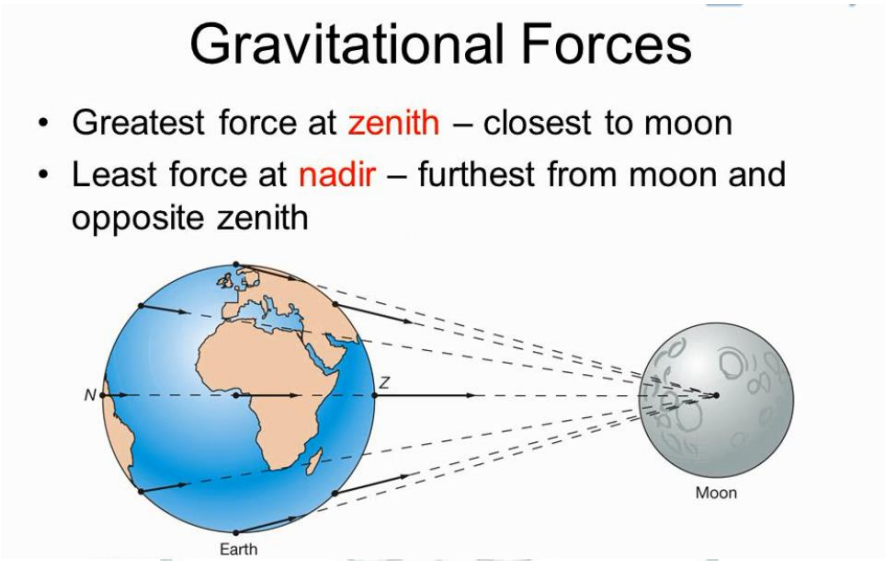
The periodical rise and fall of the sea level, once or twice a day, mainly due to the attraction of the sun and the moon, is called a tide.

The Moon's **gravitational pull** to a great extent and to a lesser extent the Sun's gravitational pull, are the major causes for the occurrence of tides. Another factor is **centrifugal force** which acts opposite to the gravitational pull of Earth.



**Zenith:**

- The term zenith is derived from an **Arabic expression** meaning **direction of the head** or **path above the head**.
- Zenith is sometimes also used to refer to the highest point that a celestial body reaches during its orbit at a given point of observation. The opposite of zenith, that is the direction of the gravitational pull, is called the **Nadir**, at 180 degrees.




**Statement Analysis:**

| Statement 1 | Statement 2 |
|---|---|
| **Correct** | **Correct** |
| Refer to the above figure.<br><br>'**Z**' denotes zenith and '**N**' represents nadir.<br>Tidal force keeps on decreasing with the distance. | Since tidal force of moon is twice that of sun the bulge is also twice in size.<br>Sun has 46% the tide generating force of the moon. |

**Q.17) Consider the following statements about "water mass":**

1. It makes up to 90% ocean waters.
2. It is more distinct below pycnocline.
3. Water mass is more developed in zones of upwelling.
4. They are not confined to one ocean.

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

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

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

**Basic Information:**

A **very large body** of water which has almost **comparable density** with some variations in salinity and temperature is called water mass.
On the basis of depth there are 3 types of water masses:

- Central (100-1000m)
- Intermediate (1000-3000m)
- Deep (>3000m)

**Source of water mass**: areas where they develop are zones of downwelling.
Common **water masses** in the world ocean are:

- Antarctic Bottom Water (AABW)
- North Atlantic Deep Water (NADW)
- Circumpolar Deep Water (CDW)
- Antarctic Intermediate Water (AAIW)
- Subantarctic Mode Water (SAMW)
- Arctic Intermediate Water (AIW)
- North Pacific Intermediate Water (NPIW)

**Statement Analysis:**

| Statement 1 | Statement 2 | Statement 3 | Statement 4 |
|---|---|---|---|
| **Correct** | **Correct** | **Incorrect** | **Correct** |
| Water masses makes up to 90-95% ocean waters. | Water mass is more distinct below pycnocline where the changes in density is not steep. | Water mass is more developed in zones of downwelling and is observed in high latitude seas or oceans where it is prominent due to brine rejection. | It is not confined to one ocean. Example a water mass can be partly in Indian Ocean and Pacific Ocean. |

**Q.18) Consider the following statements:**

1. Ansupa is the largest fresh water lake in Odisha.
2. Vellayani Lake is a freshwater lake located in Tamil Nadu.

**Select the correct statement(s):**

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

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

**Basic Information:**

**Ansupa Lake:**

- Ansupa is located 50km from Cuttack and situated in the middle of the state highway connecting Athagarh and Banki block of Cuttack district.
- Spread across 382 km, Ansupa is the largest fresh water lake in Odisha.
- The lake derives its name from its shape which is like a horse shoe (Ansupa).
- The ruins of an ancient fort on top of the **Saranda hill** adjacent to the lake adds to the charm of the place and provides a panoramic view of the lake.

**Vellayani Lake:**

- Vellayani Lake, or **Vellayani Kayal** as known in local language, is the **largest fresh water lake** in Thiruvananthapuram district, of **Kerala**.
- It is a sacred lake worshipped by local people.
- It is the venue for the boating competitions that take place in the region during the festival of Onam.

**Statement Analysis:**

| Statement 1 | Statement 2 |
|---|---|
| **Correct** | **Incorrect** |
| Ansupa is the largest fresh water lake in Odisha. | Vellayani Lake is a freshwater lake located in Kerela. |

**Q.19) Which of the following is/are correctly matched?**

| | Ocean | Gyre |
|---|---|---|
| 1. | North Pacific Subtropical Gyre | Turtle Gyre |
| 2. | Indian Ocean Gyre | Majid Gyre |
| 3. | South Atlantic Gyre | Heyerdahl Gyre |

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

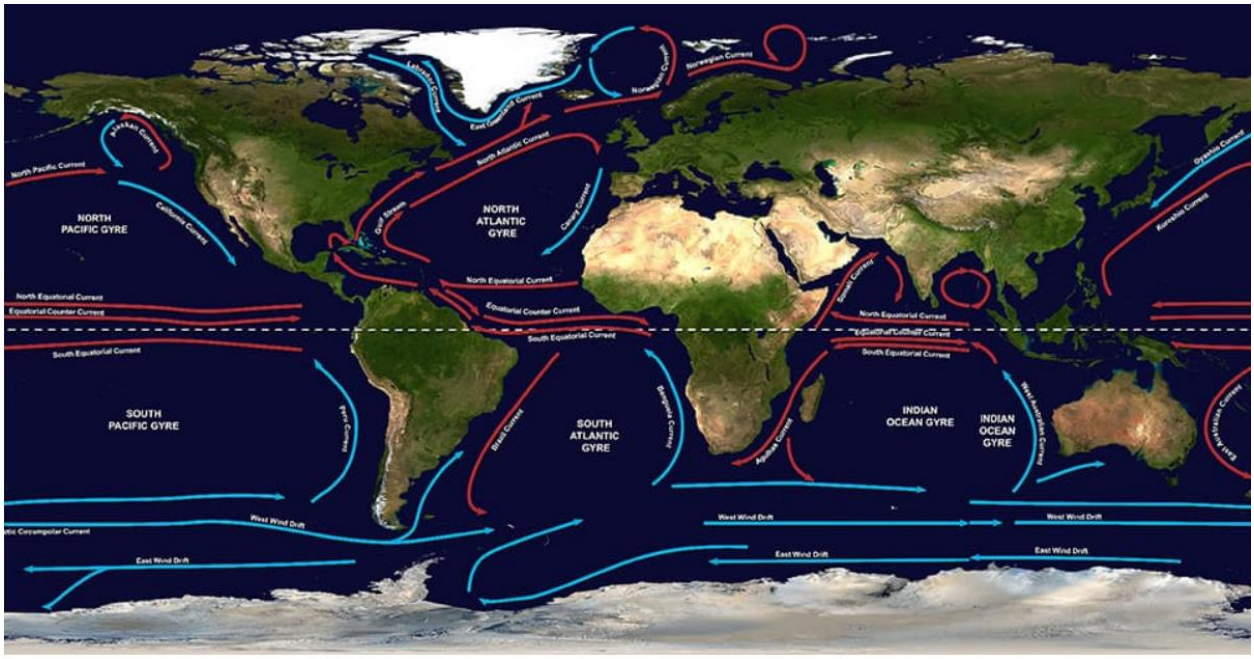
a) 1 and 2 only
b) 2 only
c) 2 and 3 only
d) 1,2 and 3

Q.19) Solution (a)

**Basic Information:**

**Gyre:**

- A gyre is a large system of rotating ocean currents.
- Wind, tides, and differences in temperature and salinity drive ocean currents. The ocean churns up different types of currents, such as eddies, whirlpools, or deep ocean currents. Larger, sustained currents—the Gulf Stream, for example go by proper names. Taken together, these larger and more permanent currents make up the systems of currents known as gyres.
- **There are five major gyres:** the North and South Pacific Subtropical Gyres, the North and South Atlantic Subtropical Gyres, and the Indian Ocean Subtropical Gyre.
- In some instances, the term "gyre" is used to refer to the collections of plastic waste and other debris found in higher concentrations in certain parts of the ocean. While this use of "gyre" is increasingly common, the term traditionally refers simply to large, rotating ocean currents.




**Explanation:**

| Ocean | Name |
|---|---|
| 1. Indian Ocean | Majid Gyre |
| 2. North Atlantic Ocean | Columbus Gyre |
| 3. South Atlantic Ocean | Prince Henry Gyre |
| 4. North Pacific Ocean | Turtle Gyre |
| 5. South Pacific Ocean | Heyerdahl Gyre |

**Q.20) With reference to "United Nations Convention on Law of the Sea (UNCLOS)" consider the following statements:**

1. The contiguous zone extends seaward up to 24 nautical miles from the boundary of territorial waters.
2. Australia has the largest Exclusive Economic Zone in the world.

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

a) 1 only

b) 2 only
c) Both 1 and 2
d) Neither 1 and 2

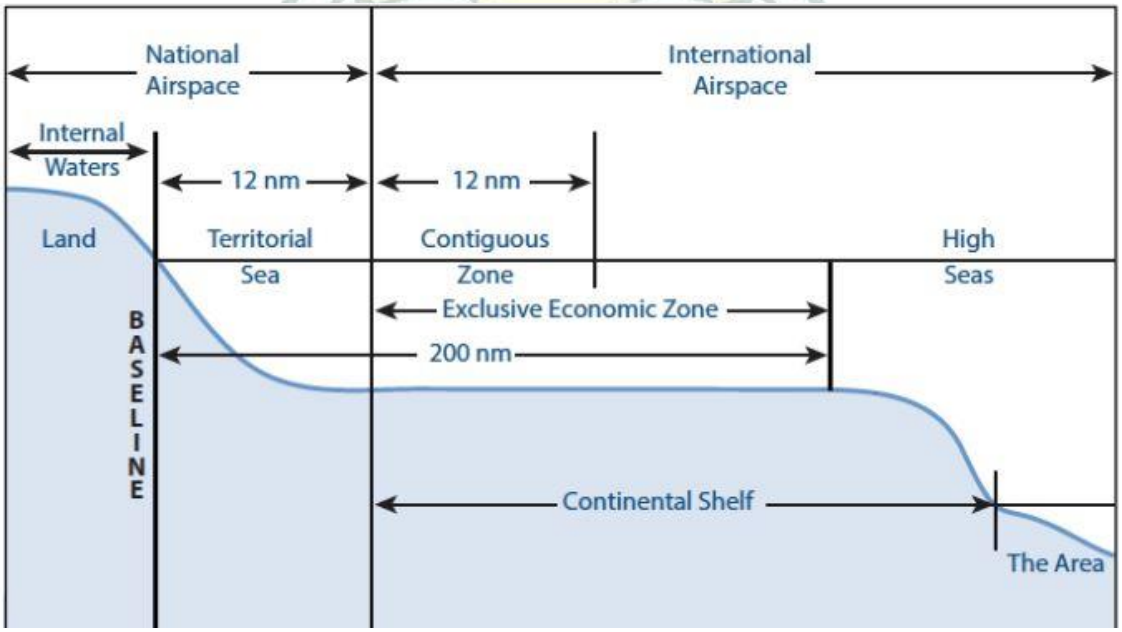
**Q.20) Solution (d)**

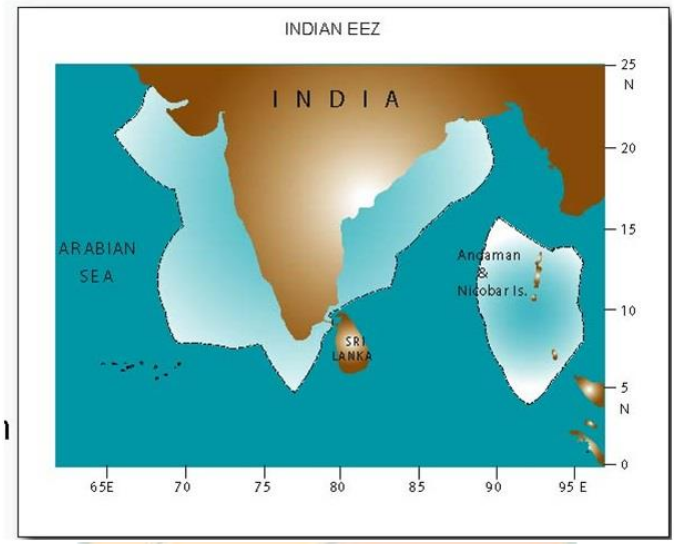
**Basic Information:**

**United Nations Convention on the Law of the Sea (UNCLOS)** 1982, also known as Law of the Sea divides marine areas into **five main zones** namely:

- Internal Waters
- Territorial Sea
- Contiguous Zone
- Exclusive Economic Zone (EEZ)
- High Seas.

UNCLOS is the **only international convention** which stipulates a framework for state jurisdiction in maritime spaces. It provides a different legal status to different maritime zones.






**Statement Analysis:**

| Statement 1 | Statement 2 |
|---|---|
| **Incorrect** | **Incorrect** |
| The contiguous zone extends seaward up to 24 nautical miles from its **baseline**.<br><br>*Note:* All the measurements are taken from the baseline.<br><br>**Baseline**: It is the low-water line along the coast as officially recognized by the coastal state. | Due to its numerous overseas departments and territories scattered all over the oceans, **France** has the largest exclusive economic zone in the world. |

**Q.21) Consider the following statements:**

1. Pravasi Bharatiya Divas is held on January 9 as it was on this day in 1916 Mahatma Gandhi returned to India from South Africa.
2. Pravasi Bharatiya Divas Convention being held every year is the flagship event of the Ministry of External Affairs.

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

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

**Q.21) Solution (d)**

| Statement 1 | Statement 2 |
|---|---|
| **Incorrect** | **Incorrect** |
| Pravasi Bharatiya Divas (PBD) is celebrated on 9th January to mark the contribution of Overseas Indian community in the development of India. **It is held on January 9 as it was on this day in 1915**, Mahatma Gandhi (the greatest Pravasi) returned to India from South Africa and led the country's freedom struggle. | **PBD Convention is the flagship event of the Ministry of External Affairs** and provides an important platform to engage and connect with the overseas Indians. PBD conventions were held every year since 2003. Since 2015, its format has been revised to celebrate the **PBD Convection once every two years**. The theme of 16th PBD Convention 2021: "Contributing to Aatmanirbhar Bharat". |

**Q.22) The 'NAVARITIH' is a certification course on which of the following?**

a) Acknowledging Traditional Skills
b) Energy Efficient technology
c) Artificial Intelligence
d) Construction Technology

**Q.22) Solution (d)**

Prime Minister released a certification course on innovative construction technologies named **NAVARITIH (New, Affordable, Validated, Research Innovation Technologies for Indian Housing).**

He also laid the foundation stone of Light House projects (LHPs) under Global Housing Technology Challenge (GHTC) - at six sites across six states.

**Q.23) Consider the following statements regarding Natural Capital Accounting and Valuation of the Ecosystem Services (NCAVES) Project:**

1. Except Russia all other BRICS countries are taking part in NCAVES Project.
2. The NCAVES Project is funded by the World Bank.
3. It is implemented by Ministry of Statistics and Programme Implementation in India.

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

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

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

| Statement 1 | Statement 2 | Statement 3 |
|---|---|---|
| **Correct** | **Incorrect** | **Correct** |
| **Natural Capital Accounting and Valuation of the Ecosystem Services (NCAVES) Project** is jointly implemented by United Nations Statistics Division (UNSD), the United Nations Environment Programme (UNEP) and the Secretariat of the Convention of Biological Diversity (CBD). **India is one of the five countries taking part in this project. The other countries** | **The NCAVES Project is funded by the European Union (EU)** through its Partnership Instrument and aims to assist the five participating partner countries. | In India, the **NCAVES Project is being implemented by Ministry of Statistics and Programme Implementation** in close collaboration with the Ministry of Environment, Forest and Climate Change (MoEF&CC) and the National Remote Sensing Centre (NRSC). NCAVES India Forum |

| | | |
|---|---|---|
| **being Brazil, China, South Africa and Mexico.** | | 2021 was organised by the MoSPI. |

**Q.24) The SANRAKSHAN KSHAMTA MAHOTSAV is a is a campaign organised by which of the following organisation?**

a) Bombay Natural History Society (BNHS)
b) Indian Council of Forestry Research and Education (ICFRE)
c) Petroleum Conservation Research Association (PCRA)
d) Nature Conservation Foundation

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

**SAKSHAM (SAnrakshan KSHAmta Mahotsav) is a is a campaign organised by Petroleum Conservation Research Association (PCRA)** to sensitize the masses about conservation and efficient use of petroleum products which will lead towards better health and environment.

It will convince consumers to switch to cleaner fuels and bring in behavioral change.

**Q.25) Consider the following pairs:**

| ***Festival*** | ***Celebrated in*** |
|---|---|
| 1. Magh Bihu | Assam |
| 2. Makara Chaula | West Bengal |
| 3. Poush Sankranti | Odisha |

**Which of the pairs given above are correctly matched?**

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

**Q.25) Solution (b)**

Sankranti is celebrated in almost all parts of India with distinct names. Here are some examples.

- Thai Pongal (Tamilnadu)
- Uttarayan (Gujarat)
- Lohri (Punjab)
- **Poush Sankranti (Bengal)**
- Makara Sankramana (Karnataka)
- **Makara Chaula (Odisha)**
- Maghi Sankrant (Maharashtra and Haryana)
- **Magh/Bhogali Bihu (Assam)**
- Shishur Saenkraat (Kashmir)
- Khichdi Parv (UP and Bihar)

**Q.26) Which of the following international organisations are part of Intergovernmental Negotiations framework (IGN)?**

1. G4 nations
2. African Union
3. Arab League
4. European Union

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

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

**Q.26) Solution (b)**

The **Intergovernmental Negotiations framework (IGN)** is a group of nation-states working within the United Nations to further reform of the United Nations Security Council (UNSC), 15-member top organ of the world body.

The IGN is composed of several different international organizations, namely: (1) The **African Union**; (2) The **G4 nations** (India, Brazil, Japan and Germany); (3) The Uniting for Consensus Group (UfC); (4) The L.69 Group of Developing Countries; (5) **The Arab League**; (6) The Caribbean Community (CARICOM).

Each group represents a different set of positions vis-a-vis reforming the United Nations Security Council.

**Q.27) The only species of Indian turtle which is listed as 'Critically Endangered' in IUCN Red Data List is**

a) Green sea turtle
b) Hawksbill sea turtle
c) Loggerhead sea turtle
d) Leatherback sea turtle

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

Five species of Indian turtles along with their IUCN status are as follows:

1. Olive Ridley – Vulnerable
2. Green turtle – Endangered
3. Loggerhead – Vulnerable
4. **Hawksbill – Critically Endangered**
5. Leather back – Vulnerable

They are protected in Indian Wildlife Protection Act of 1972, under Schedule I.

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

1. Knowledge Workers
2. Safety and Legal Environment
3. Social Capital
4. Knowledge Diffusion

**Which of the parameters given above are used to measure India Innovation Index?**

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

**Q.28) Solution (c)**

NITI Aayog, along with the Institute for Competitiveness released the second edition of the India Innovation Index 2020.

The innovation inputs were measured through five enabler parameters, and the output through two performance parameters.

- Enabler Parameters: **'Human Capital'**, 'Investment', **'Knowledge Workers'**, 'Business Environment', **'Safety and Legal Environment'**.
- Performance Parameters: 'Knowledge Output' and **'Knowledge Diffusion'**.

The states have been bifurcated into three categories:

- Major states: Top performers are Karnataka, Maharashtra, Tamil Nadu, Telangana.
- North-east and hill states: Top performers are Himachal Pradesh, Uttarakhand, Manipur.
- UTs and City States: Top performers are Delhi, Chandigarh, Daman and Diu.

**Q.29) The Global Investment Trend Monitor Report is released by which of the following organisation?**

a) World Bank
b) World Economic Forum (WEF)
c) United Nations Conference on Trade and Development (UNCTAD)
d) United Nations Industrial Development Organization (UNIDO)

**Q.29) Solution (c)**

**Global Investment Trend Monitor Report is released by the United Nations Conference on Trade and Development (UNCTAD).**

- UNCTAD is a permanent intergovernmental body headquartered at Geneva in Switzerland.

- Some of the reports published by UNCTAD are: Trade and Development Report; World Investment Report and The Least Developed Countries Report.

**Q.30) Which of the following has/have shrunk immensely/dried up in the recent past due to human activities?**

1. Aral Sea
2. Black Sea
3. Lake Chad

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

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

**Q.30) Solution (d)**

**Aral Sea** is a saltwater lake of Central Asia (between Kazakhstan to the north and Uzbekistan to the south). From 1960s, the Aral Sea began shrinking quite rapidly, with the lake's level dropping 20-35 inches yearly.

Lake Chad is a historically large, shallow, endorheic lake in central Africa, which has varied in size over the centuries. One of Africa's largest freshwater bodies, **Lake Chad**, has shrunk by 90 per cent.

**Q.31) A mixture of certain quantity of milk with 18 litre of water is worth 0.5 Rs per litre. If pure milk be worth 3.5 Rs per litre, the how much milk is there in the mixture?**

a) 6 litre
b) 4 litre
c) 3 litre
d) 2 litre

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

Water is available free of cost, so its cost price is = 0

Now, according to the rule of allegation,


Therefore, water: milk = 3:0.5 = 6:1

Clearly, quantity of milk = 1/6 of water, i.e. (1/6)*18 = 3 litre

**Q.32) A dishonest milkman professes to sell his milk at cost price but he mixes it with water and there by gains 25%. The percentage of water in the mixture is?**

a) 18%
b) 20%
c) 25%
d) 30%

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

Here the milkman gains 25% i.e.1/4

This means, For every 5 litres of milk he sells 1 litre of it contains water

So, the percentage of water in the mixture = (1/5) × 100 = 20%

**Q.33) A shopkeeper purchased 15 kg of variety A rice at X Rs per kg and 10 kg of variety B rice at 'X+ 5' Rs per kg. The shopkeeper sold the whole quantity of variety A rice at 10% profit and that of variety B rice at 20% profit. The total selling price of variety A rice was Rs 30 more than that of variety B rice. Had the two varieties been mixed and sold at an overall profit of 20%, what would have been the selling price of the mixture per kg?**

a) Rs 23.5
b) Rs 26.4
c) Rs 27.25
d) Rs 28.2

**Q.33) Solution (b)**

Total revenue generated by selling variety A rice = 1.1*15X = 16.50X

Total revenue generated by selling variety B rice = 1.2*10(X+5) = 12X + 60

It is given that, 16.5X - 12X - 60 = 30

X = 20 Rs.

When the two varieties were mixed and sold at an overall profit of 20%, the total weight of the entire mixture = 10+15 = 25 kg.

Total cost price of the mixture = 15*20 + 10*25 = 550 Rs

Therefore, the cost price of the mixture per kg = 550/25 = Rs 22 per kg.

It is known that the mixture was sold at a profit of 20%. Therefore, the selling price of the mixture = 1.2*22 = Rs 26.40.

Hence, option b is correct

**Q.34) A water tank can hold 50 litres of water. During the time of observation, it was 3/4 full, after which 1/2 of the water was drained away. There was an increase in water volume by 2 litres due to rain. How much water was thereafter the observation period?**

a) 20.75 litres
b) 19.75 litres
c) 18.5 litres
d) 15 litres

**Q.34) Solution (a)**

The initial quantity of water = 3/4*50 litres

If half of the existing water was drained away then the remaining quantity of water

= 3/4*50 – 1/2[3/4*50]

= 1/2[3/4*50]

After it rained the quantity of water will be

= 1/2[3/4*50] + 2 = 83/4 = 20.75 litres

**Read the following passage and answer the question that follow. Your answer to this question should be based on passage only.**

Developed countries have made adequate provisions for social security for senior citizens. State insurers (as well as private ones) offer Medicare and pension benefits to people who can no longer earn. In India, with the collapse of the joint family system, the traditional shelter of the elderly has disappeared. And a State faced with a financial crunch is not in a position to provide social security. So, the working population should give serious thought to building a financial base for itself.

**Q.35) Which one of the following if it were to happen, weakens the conclusion drawn in the above passage the most?**

a) The investable income of the working population, as a proportion of its total income, will grow in the future
b) The insurance sector is underdeveloped and trends indicate that it will be extensively privatized in the future
c) India is on a path of development that will take it to a developed country status, with all its positive and negative implications
d) If the working population builds a stronger financial base, there will be a revival of the joint family system

**Q.35) Solution (c)**

The main conclusion of the paragraph is that the working population should save for its future given that the Indian state is not in a position to provide social security for its citizens. The underlying assumption is that the Indian state would not be in a position to provide social

security even in the future. If option c is true, then this assumption is attacked and the conclusion is weakened.