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Q.1) Which of the following evidence formed the basis for the “SeaFloor Spreading” hypothesis put forth by Harry Hess?

1. Young oceanic crust rocks compared to older continental rocks.
2. Deep earthquakes foci at mid-oceanic ridges.
3. Similar magnetic properties of rocks equidistant on either sides of the crest of mid-oceanic ridges.
4. Active volcanoes along continent-ocean margins.

Choose the correct option:

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

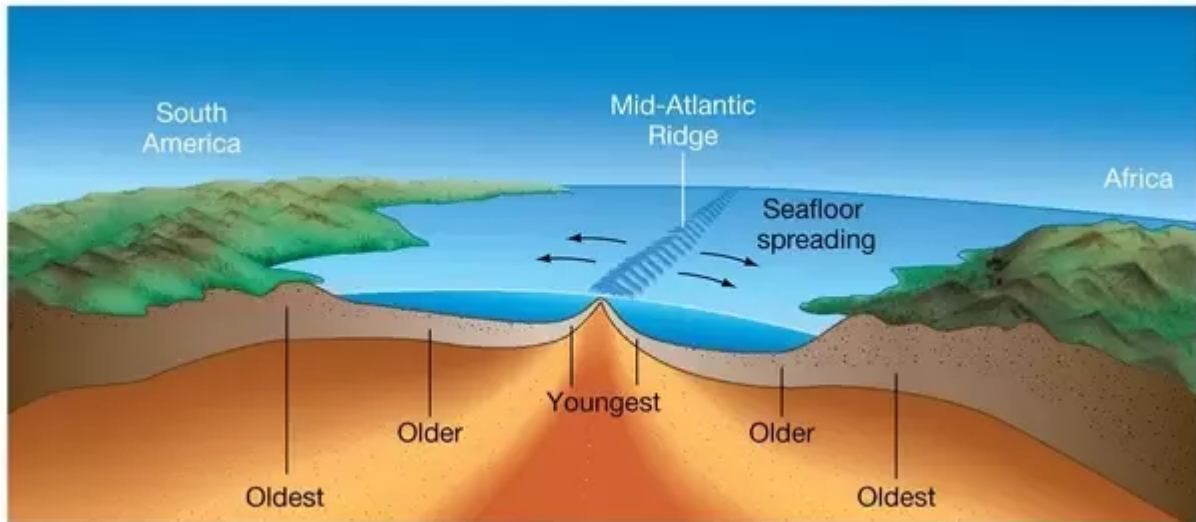
Q.1) Solution (b)

Explanation:

Sea-Floor Spreading:

- Seafloor spreading is a process that occurs at mid-ocean ridges, where new oceanic crust is formed through volcanic activity and then gradually moves away from the ridge.
- Seafloor spreading helps explain continental drift in the theory of plate tectonics.
- The hypothesis of seafloor spreading was forwarded by Harry Hammond Hess.
- The ocean floor that gets pushed due to volcanic eruptions at the crest, sinks down at the oceanic trenches and gets consumed. Hence the oceanic crust is simultaneously formed at the mid-oceanic ridge and consumed at oceanic trenches. Thus, ocean crust rocks are much younger than the continental rocks.
- The hypothesis was based on the following observations.
 1. All along the mid-oceanic ridges, volcanic eruptions are common and they bring a huge amount of lava to the surface.
 2. The rocks equidistant on either side of the ridges show remarkable similarities in terms of period of formation, chemical compositions and magnetic properties.
 3. The ocean crust rocks are much younger than the continental rocks. The age of rocks in the oceanic crust is nowhere more than 200 million years old. Some of the continental rock formations are as old as 3,200 million years.
 4. The sediments on the ocean floor are very thin.

5. The oceanic ridge areas have shallow earthquake foci while the deep trenches have deep seated foci.



Q.2) Which of the following are the examples of cold ocean currents?

1. Humboldt Current.
2. Kuroshio Current.
3. Falkland Current.
4. Labrador Current.

Choose the correct option:

- a) 1 and 2
- b) 1, 2 and 3
- c) 1, 3 and 4
- d) All of the above.

Q.2 Solution (c)

Basic Information:

List of Ocean Currents:

Warm Ocean Currents	Cold Ocean Currents
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<ol style="list-style-type: none"> 1. North Equatorial Current 2. Kuroshio Current 3. North Pacific Current 4. Alaskan Current 5. Counter Equatorial Current, 6. El Nino Current 7. Tsushima Current 8. South Equatorial Current 9. East Australian Current 10. Florida Current 11. Gulf Stream 12. Norwegian Current 13. Irminger Current 14. Rannell Current 15. Antilles Current 16. Brazilian Current 17. Mozambique Current 18. Agulhas Current 	<ol style="list-style-type: none"> 1. Humboldt or Peruvian Current 2. Kuril or Oyashio Current 3. California Current 4. Antarctica Current 5. Okhotsk Current 6. Labrador Current 7. Canary Current 8. Eastern Greenland Current 9. Benguela Current 10. Antarctica Current 11. Falkland Current 12. Somali Current 13. Western Australian Current
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Q.3) Which of the following trenches are correctly matched with their location?

Trench

Ocean

- | | |
|-----------------------|----------------|
| 1. Puerto Rico Trench | Pacific Ocean |
| 2. Sunda Trench | Indian Ocean |
| 3. Phillipine Trench | Indian Ocean |
| 4. Tonga Trench | Atlantic Ocean |

Choose the correct option:

- a) 2 only
- b) 1 and 2
- c) 2 and 3
- d) All of the above.

Q.3) Solution (a)

Basic Information:

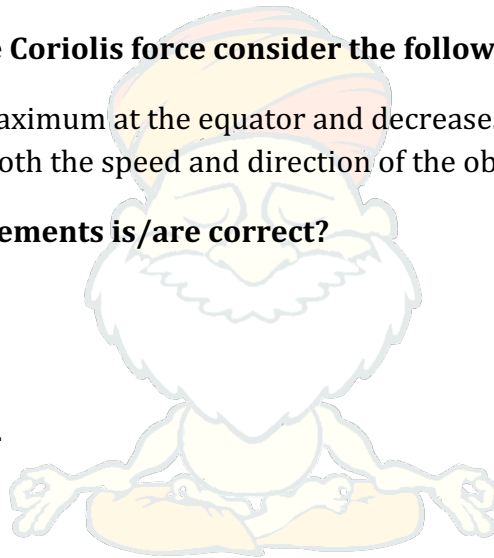
Ocean	Name of the trench
Pacific Ocean	Mariana Trench, Tonga Trench, Kurile Trench, Karmadec Trench, Phillipine Trench, Japan Trench, Peru-Chile Trench
Atlantic Ocean	Peurto-Rico Trench, South Sandwich Trench, Cayman Trench, Romanche trench, Norwegian trench.
Indian Ocean	Sunda Trench, Diamantia trench, sumatra trench.

Q.4) With respect to the Coriolis force consider the following statements.

1. Coriolis force is maximum at the equator and decreases towards poles.
2. Coriolis changes both the speed and direction of the object.

Which of the above statements is/are correct?

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



Q.4) Solution (d)

Basic Information:

Coriolis effect: It is a deflecting force experienced due to rotation of earth. Because of coriolis the air appears to turn towards its right in the northern hemisphere and towards its left in the southern hemisphere. The coriolis always acts in the perpendicular direction of the motion of air. It is zero at the equator and increases towards the poles.

The following are four basic points to remember about the Coriolis effect:

1. Regardless of the initial direction of motion, any freely moving object appears to deflect to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.

2. The apparent deflection is strongest at the poles and decreases progressively toward the equator, where the deflection is zero.
3. The Coriolis effect is proportional to the speed of the object, and so a fast-moving object is deflected more than a slower one.
4. The Coriolis effect influences direction of movement only; it does not change the speed of an object.

Statement Analysis:

Statement 1	Statement 2
Incorrect	Incorrect
Coriolis effect is maximum at the poles and decreases towards the equator.	Coriolis force only changes the direction of movement and not the speed of an object.

Q.5) With respect to the ocean deposits consider the following statements.

1. Red Clay is found prominently at the continental shelf area.
2. Oozes are mud which contain shells and skeletons of marine organisms.

Choose the correct option:

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

Q.5) Solution (b)**Basic Information:**

The ocean deposits can broadly be divided into two types:

1. The terrigenous deposits: These are found on the continental shelves and slopes and mainly consist of the rock material derived because of wear and tear.
2. The pelagic deposits: These are found over deep sea plains. These deposits mainly consist of organic remains of plants and animals.

1. Terrigenous Deposits:

- Terrigenous deposits are derived from the wear and tear of land and volcanic and organic products found majorly in the continental slope and shelf areas.
- On the basis of size of particles, the terrigenous deposits may be categorised into three classes— mud, sand and gravel.
- Mud refers to the finest particles which comprise the minute particles of rock forming minerals, principally quartz. Mud deposits are classified into blue, green and red types, based on the colour of constituents.
- Sand refers to the coarser particles.
- Gravel has even bigger particles.

2. Pelagic deposits:

- Pelagic deposits comprise 75% of the total sea floor.
- Pelagic materials consist of both organic and inorganic materials.
- Organic materials are in the form of a kind of liquid mud, called ooze, which contains shells and skeletons of various marine organisms.
- The ooze is said to be calcareous when the shell is made of calcium carbonate. The calcareous ooze may be either pteropod ooze or globigerina ooze. When the shell is made of silica, the ooze is said to be siliceous ooze, which can be either the diatom type or the radiolarian type of ooze.
- Inorganic materials are in the form of red clay of volcanic origin. The chief constituents of red clay are silicon and aluminium dioxide, while other constituents include iron, manganese, phosphorus and radium. The red clay is the most widely spread pelagic deposit and covers 38% of the sea floor.

Statement Analysis:

Statement 1	Statement 2
Incorrect	Correct
Red Clay is found predominantly in deep sea floors.	Oozes mainly consist of organic remains of marine organisms.

Q.6) Consider the following statements with respect to the salinity distribution of oceans.

1. Salinity of the high pressure belts between 20 and 30 degrees in both the hemispheres is lower than the temperate regions.
2. Salinity at the surface of the ocean is greater than the salinity at the bottom.

Which of the above statements is/are correct?

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

Q.6) Solution (d)

Basic Information:

Ocean salinity is majorly decided by following factors.

- (i) The salinity of water in the surface layer of oceans depends mainly on evaporation and precipitation.
- (ii) Surface salinity is greatly influenced in coastal regions by the freshwater flow from rivers, and in polar regions by the processes of freezing and thawing of ice.
- (iii) Wind also influences the salinity of an area by transferring water to other areas.
- (iv) The ocean currents contribute to the salinity variations. Salinity, temperature and density of water are interrelated. Hence, any change in the temperature or density influences the salinity of water in an area.

Statement Analysis:

Statement 1	Statement 2
Incorrect	Incorrect
The waters fringing the high pressure belts between 20 and 30 degree latitudes in both hemispheres have high salinity due to high rate of evaporation caused by high temperature and low humidity. The temperate oceans have lower salinity due	The surface salinity is influenced by several factors like the rate of evaporation, inflow of the river waters, ocean currents etc. Hence, one cannot generally predict that surface salinity is always greater than the salinity at the

to the lower temperature and a lower rate of evaporation.	bottom. It varies from place to place.
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Q.7) What does the term “Brown Tide” refer to?

- a) Harmful Algal Blooms
- b) Upwelling of clay particles to the surface near the ocean margins.
- c) High tides occurring during the equinox.
- d) Incoming sand water near the coastal areas due to tsunami waves.

Q.7) Solution (a)**Explanation:**

Brown tides are part of growing world-wide incidences of harmful algal blooms (HAB) which are caused by a proliferation of single-celled marine plants called phytoplankton. One species of phytoplankton, the microscopic alga *Aureococcus anophagefferens* may bloom in such densities that the water turns dark brown, a condition known as "Brown tide".

Q.8) With respect to ‘Upwelling’ consider the following statements:

1. Upwelling brings deeper, colder nutrient rich water to the surface.
2. Upwelling occurs only in coastal areas.
3. The zones of upwelling are productive zones for fishing.

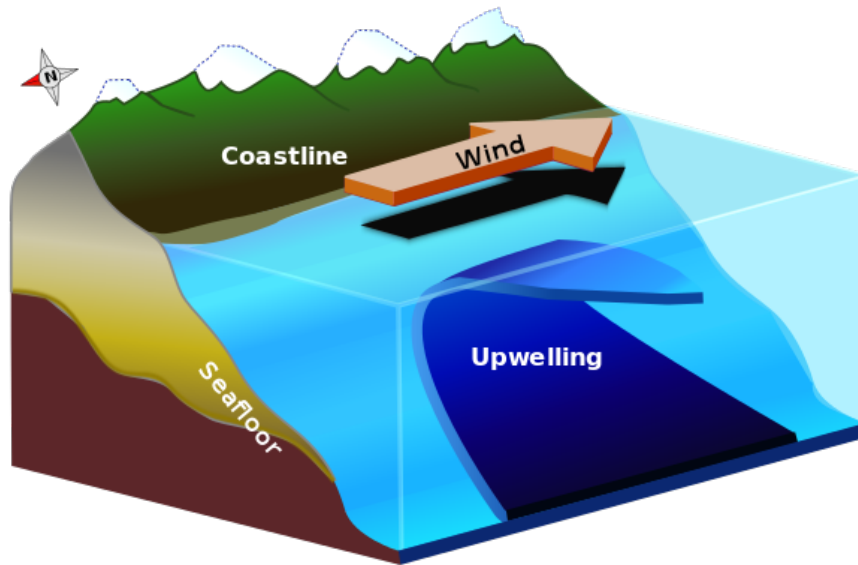
Which of the statements given above is/are correct?

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

Q.8) Solution (b)**Basic Information:**

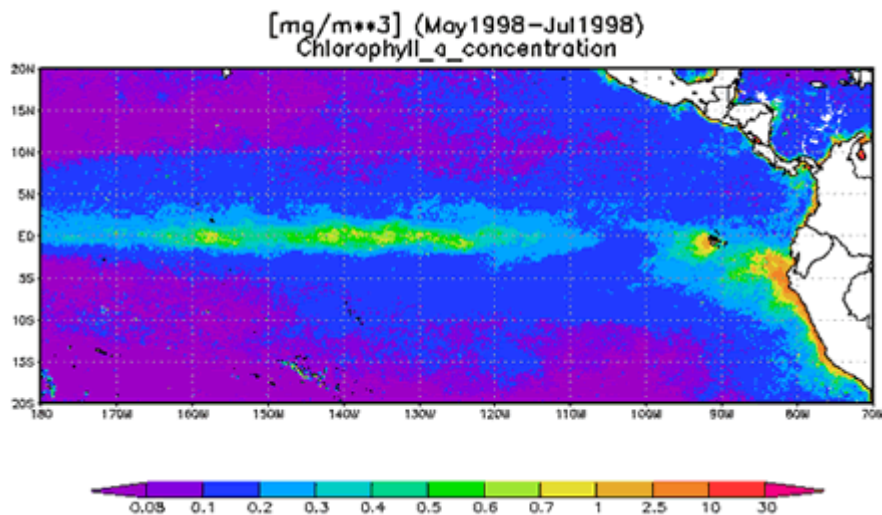
Upwelling is an oceanographic phenomenon that involves wind-driven motion of dense, cooler, and usually nutrient-rich water towards the ocean surface, replacing the

warmer, usually nutrient-depleted surface water. The nutrient-rich upwelled water stimulates the growth and reproduction of primary producers such as phytoplankton.



The increased availability of nutrients in upwelling regions results in high levels of primary production and thus fishery production.

There are at least five types of upwelling: coastal upwelling, large-scale wind-driven upwelling in the ocean interior, upwelling associated with eddies, topographically-associated upwelling, and broad-diffusive upwelling in the ocean interior including the upwelling at equatorial areas.



Upwelling in the equatorial areas

Statement Analysis:

Statement 1	Statement 2	Statement 3
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Correct	Incorrect	Correct
When wind blows from land towards the ocean the surface water is replaced by deeper, cold water which is rich in nutrients.	It occurs even at equator near inter tropical convergence zones.	World's best fishing zones are present in upwelling zones.

Q.9) Consider the following statements with respect to the tides.

1. Neap tides and spring tides occur in the gap of seven days.
2. The tidal bulges in the narrow continental shelves have greater height.

Which of the above statements is/are correct?

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

Q.9) Solution (a)

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
- Based on the position of Sun, Moon and Earth tides are classified into spring and neap tide

Spring Tides	Neap Tides
When the sun, the moon and the earth are in a straight line, the height of the tide will be higher. These are called spring tides and they occur twice a month, one on full moon period and another during new moon period.	Normally, there is a seven day interval between the spring tides and neap tides. At this time the sun and moon are at right angles to each other and the forces of the sun and moon tend to counteract one another. The Moon's attraction, though more than twice as strong as the sun's, is diminished by the counteracting force of the sun's gravitational pull.


Statement Analysis:

Statement 1	Statement 2
Correct	Incorrect
Normally there is a seven day gap between the spring tide and the neap tide.	The tidal bulges have greater height in wide continental shelves. (Not narrow continental shelves).


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Q.10) With respect to the Kelp Forests consider the following statements.

1. Kelp forests are recognised as most dynamic and productive ecosystems on the Earth.
2. They occur only in the temperate and polar coastal areas.

Which of the above statements is/are correct?

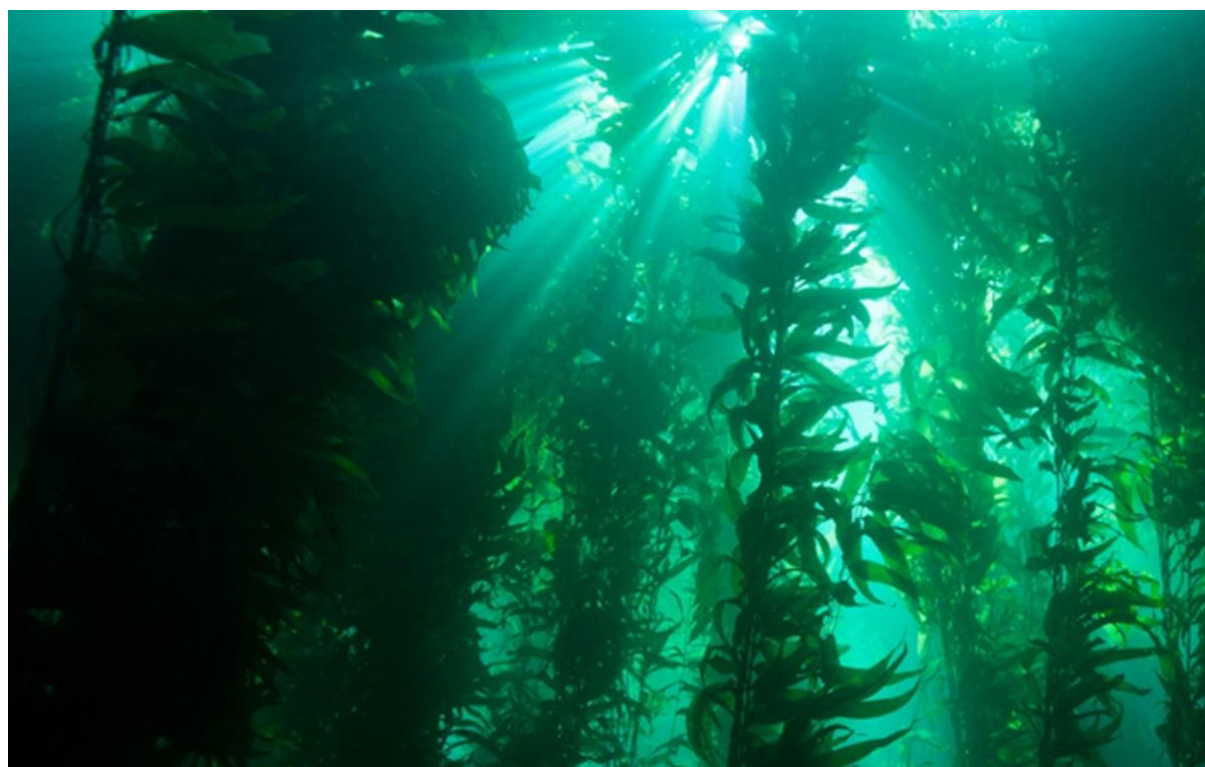
- a) 1 only
- b) 2 only
- c) 1 and 2
- d) None of the above.

Q.10) Solution (a)

Basic Information:

Kelp Forests:

- Kelp forests are underwater areas with a high density of kelp, which covers about 25% of the world's coastlines.
- Kelp are large brown algae that live in cool, relatively shallow waters close to the shore. They grow in dense groupings much like a forest on land. These underwater towers of kelp provide food and shelter for thousands of fish, invertebrates, and marine mammal species.
- Kelp forests provide a unique habitat for marine organisms and are a source for understanding many ecological processes.
- Kelp forests occur worldwide throughout temperate and polar coastal oceans.

**Statement Analysis:**

Statement 1	Statement 2
Correct	Incorrect
Kelp forests are the most dynamic and	Kelp forests are usually found in

productive ecosystems habiting diversity of marine organisms.

temperate and polar coastal regions. But in 2007, they were also discovered in tropical waters near Ecuador.

Q.11) Arrange the following salts in the decreasing order of their concentration in seawater.

1. Magnesium
2. Sodium
3. Potassium
4. Calcium.

Choose the correct option:

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

Q.11) Solution (b)

Basic Information:

Concentration of salts in seawater:

Compound/Salt	Parts Per Million (PPM) in sea water
Chloride	18980
Sodium	10561
Magnesium	1272
Sulfur	884
Calcium	400
Potassium	380

Bromine	65
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Q.12) The Grand Banks of New-Foundland are the biggest fishing grounds in the world. The reason behind this is

- a) Grand Banks have a large influx of river water which adds nutrients to the coastal water.
- b) The cold Labrador current and warm Gulf Stream mixes near the vicinity producing favourable conditions for growth of plankton.
- a) Grand banks have deeper continental shelves.
- b) Grand banks have lower salinity.

Q.12) Solution (b)

Explanation:

- The Grand Banks of Newfoundland are a group of underwater plateaus south-east of Newfoundland on the North American continental shelf.
- These areas are relatively shallow, ranging from 15 to 91 metres in depth.
- The cold Labrador Current mixes with the warm waters of the Gulf Stream here, often causing extreme foggy conditions. The mixing of these waters and the shape of the ocean bottom lifts nutrients to the surface. These conditions helped to create one of the richest fishing grounds in the world.

Q.13) Which of the following are correctly matched?

Glacier In India	State/Union Territory
1. Zemu Glacier	Arunachal Pradesh
2. Siachen Glacier	Ladakh
3. Gangotri Glacier	Himachal Pradesh
4. Nun Kun Massif	Ladakh

Choose the correct option:

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

Q.13) Solution (a)**Basic Information:****List of glaciers in India:**

State/Union Territory	Glacier
Ladakh/Jammu Kashmir	Siachen, Hari Parbhat, Nun Kun Massif, Nubra
Uttarakhand	Gangotri, Satopanth
Himachal Pradesh	Bara Shigri, Beas Kund, Chhota Shigri
Sikkim	Zemu, Rathong, Lonak
Arunachal Pradesh	Bichom, Kangto

Q.14) Which of the following are favourable conditions for the growth of coral reefs?

1. Temperature in the range of 18-25 degree centigrade.
2. High saltish waters.
3. Low sediment waters.
4. Shallow waters.

Choose the correct option:

- a) 1 and 2 only
- b) 1 and 3 only
- c) 1 and 4 only
- d) All of the above.

Q.14) Solution (d)**Basic Information:****Coral Reefs:**

- A coral reef is an underwater ecosystem characterised by reef-building corals.
- Reefs are formed of colonies of coral polyps held together by calcium carbonate.

Favourable conditions for growth of Coral Reefs:

The reef building corals survive best under the following conditions:

- The temperature should be moderate between 18-25 degree centigrade. They will not flourish where there are cold currents because of the upwelling of the cold water. Hence coral reefs are generally absent on the western coasts of the continents.
- The depth of the water should not exceed 180 feet (Shallow waters) because beyond this depth sunlight is too faint for photosynthesis to take place. This is essential for the survival of the microscopic algae on which coral polyps depend.
- The water should be saltish.
- The waters should be free from sediments. Corals therefore survive best in the moving ocean water well away from the silty coasts or muddy mouths of streams.
- The corals are best developed on the seaward side of the reef where constantly moving waves, tides and currents maintain an abundant supply of clear and oxygenated water.

Q.15) According to the United Nations Convention on Law of the Sea (UNCLOS) what does the term “Territorial Waters” refer to?

- a) Area covering all water and waterways on the landward side of the baseline.
- b) Area upto 12 nautical miles from the baseline.
- c) Area upto 24 nautical miles from the baseline.
- d) Area upto 200 nautical miles from the baseline.

Q.15) Solution (b)**Basic Information:****UNCLOS:**

- The United Nations Convention on the Law of the Sea (UNCLOS) also called the Law of the Sea Convention or the Law of the Sea treaty is the international agreement that resulted from the third United Nations Conference on the Law of the Sea (UNCLOS III) which took place between 1973 and 1982.
- The Law of the Sea Convention defines the rights and responsibilities of nations with respect to their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of marine natural resources.
- The convention set the limit of various areas, measured from a carefully defined baseline.

The areas are as follows:

1. Internal waters:

- Covers all water and waterways on the landward side of the baseline.
- The coastal state is free to set laws, regulate use, and use any resource.
- Foreign vessels have no right of passage within internal waters.

2. Territorial waters:

- Area upto to 12 nautical miles from the baseline.
- The coastal state is free to set laws, regulate use, and use any resource.
- Vessels are given the right of innocent passage through any territorial waters.

3. Contiguous zone:

- Beyond the 12-nautical-mile (22 km) limit, there is a further 12 nautical miles (22 km) from the territorial sea baseline limit, the contiguous zone, in which a state can continue to enforce laws in four specific areas: customs, taxation, immigration and pollution.

4. Exclusive economic zones (EEZs):

- These extend 200 nautical miles from the baseline.
- Within this area, the coastal nation has sole exploitation rights over all natural resources.

Q.16) Which of the following are freshwater lakes in India?

1. Vembanad Lake
2. Kolleru Lake
3. Tso Moriri
4. Pulicat lake

Choose the correct option:

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

Q.16) Solution (b)

Basic Information:

Saline Water Lakes in India	Freshwater Lakes in India
Sambhar lake, Chilika lake, Pulikat lake, Pongong Tso lake, Vembanad lake, Degana lake, Didwana lake, Tso Moriri, Kuchaman in Rajasthan etc	Kolleru lake, Loktak lake, Sardar Sarovar lake, Indira Sagar lake, Chandratal, suraj tal, Deepor Beel. Sheshnag, etc.

Q.17) With respect to the estuaries consider the following statements.

1. Estuaries filter water providing favourable habitats for marine organisms.
2. Estuaries provide ideal conditions for ports.

Which of the above statements is/are correct?

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

Q.17) Solution (c)

Basic Information:

Estuaries:

- An estuary is a partially enclosed coastal body of brackish water with one or more rivers or streams flowing into it and with a free connection to the open sea.
- Estuaries form a transition zone between river environments and maritime environments known as ecotone.

- Estuaries are subject both to marine influences such as tides, waves, and the influx of saline water and to riverine influences such as flows of freshwater and sediment.
- The mixing of seawater and freshwater provides high levels of nutrients both in the water column and in sediment making estuaries among the most productive natural habitats in the world.

Statement Analysis:

Statement 1	Statement 2
Correct	Correct
Estuaries filter out sediments and pollutants from rivers and streams before they flow into the oceans. Hence they provide a healthy environment for marine organisms to thrive.	Estuaries are an important part of the shipping industry because there are many industrial ports located in estuaries due its depth of water and connection with open sea.

Q.18) The movement of ocean currents is influenced by several factors. Which of the following are the primary forces that initiate the movement of ocean currents?

1. Heating by solar energy
2. Wind
3. Gravity
4. Coriolis force

Choose the correct option

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

Q.18) Solution (d)

Basic Information:

- Ocean currents are like river flow in oceans. They represent a regular volume of water in a definite path and direction.

- Ocean currents are influenced by two types of forces namely :
 - (i) Primary forces that initiate the movement of water;
 - (ii) Secondary forces that influence the currents to flow.

The primary forces that influence the currents are:

- (i) heating by solar energy
 - (ii) wind
 - (iii) gravity
 - (iv) coriolis force.
- 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 very slight gradient and water tends to flow down the slope.
 - 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.
 - Gravity tends to pull the water down the pile and create gradient variation.
 - 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.

Q.19) Consider the following statements with respect to sea surface temperature.

1. The oceans in the northern hemisphere have higher temperature than the ocean in the southern hemispheres.
2. The sea surface temperature is maximum at the equator.

Which of the above statements is/are correct?

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

Q.19) Solution (a)

Basic Information:


The sea surface temperature is influenced by several factors. Prominent among them include.

1. Latitude: The temperature of surface water decreases from the equator towards the poles because the amount of insolation decreases poleward.
2. Unequal distribution of land and water: The oceans in the northern hemisphere receive more heat due to their contact with larger extent of land than the oceans in the southern hemisphere.
3. Prevailing wind: 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. It results in longitudinal variation in the temperature. Contrary to this, the onshore winds pile up warm water near the coast and this raises the temperature.
4. Ocean currents: Warm ocean currents raise the temperature in cold areas while the cold currents decrease the temperature in warm ocean areas.

Statement Analysis:

Statement 1	Statement 2
Correct	Incorrect
The oceans in the Northern hemisphere have high temperature due to high density of landmass. Influence of land mass is relatively less in the southern hemisphere and hence they have lesser sea surface temperature.	The highest sea surface temperature is recorded at the sub-tropical high pressure belts due to subsidence of air. This produces anticyclonic conditions and clear sky. At the equator the high amount of precipitation and cloudy sky reduces the sea surface temperature.

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Q.20) What does the term 'Halocline' refer to?

- a) Line joining points of equal salinity in oceans.
- b) Line joining points of equal temperature in oceans.
- a) Zone representing the sharp increase in the salinity of the ocean water.
- b) Zone representing the sharp decrease in the temperature of the ocean water.

Q.20) Solution (c)**Explanation:**

- Halocline represents the vertical zone in the oceanic water column in which salinity changes rapidly with depth. It is located below the well-mixed uniformly saline surface water layer.
- Salinity generally increases with depth in the ocean waters.
- The lower salinity water rests above the higher salinity dense water.

Q.21) Which among the following are considered active factors in soil formation?

1. Parent material
2. Topography
3. Climate
4. Biological activity
5. Time

Choose the correct option.

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

**Q.21) Solution (c)****Basic Information:**

- There are five basic factors controlling the formation of soils: (i) parent material; (ii) topography; (iii) climate; (iv) biological activity; (v) time
- Climate and biological activity are considered active agents due to their intensity and influence in soil formation.
- Other factors like topography, parent material and time are passive factors.

NOTE: Only active factors were asked.

Q.22) With respect to the metamorphic rocks consider the following pairs:

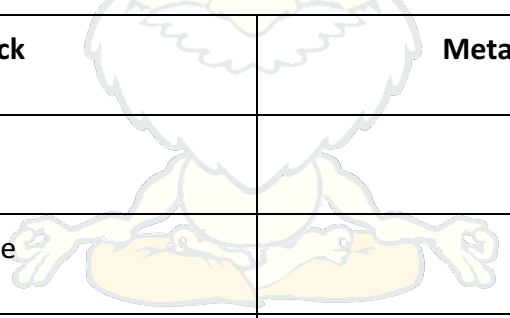
<u>Parent rock</u>	<u>Metamorphic rock</u>
1. Limestone	Marble
2. Sandstone	Quartzite
3. Granite	Schist
4. Shale	Clay

Which of the above pairs are correctly matched?

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

Q.22) Solution (b)

Basic Information:



Parent rock	Metamorphic rock
Clay	Slate
Limestone	Marble
Sandstone	Quartzite
Granite	Gneiss
Shale	Schist and slate
Coal	Graphite

Q.23) Consider the following conditions of climate.

1. Average rainfall of 100 cms mostly from the North-East Monsoons in October-December.
2. Mean Annual temperature about 28 degree centigrade.
3. Mean Humidity about 75 percent.

Which of the following forests types grow well in the above mentioned conditions?

- a) Tropical Moist Deciduous Forests.
- b) Swamp Forests.
- c) Tropical Wet Evergreen Forests.
- d) Tropical Dry Evergreen Forests.

Q.23) Solution (d)

Basic Information:

India's vegetation can be divided into 5 main types and 16 sub-types.

Main Type	Sub Type
Moist Tropical Forests	<ul style="list-style-type: none"> • Tropical Wet Evergreen • Tropical Semi-Evergreen • Tropical Moist Deciduous • Littoral and Swamp
Dry Tropical Forests	<ul style="list-style-type: none"> • Tropical Dry Evergreen • Tropical Dry Deciduous • Tropical Thorn
Montane Subtropical Forests	<ul style="list-style-type: none"> • Subtropical Broad Leaved Hill • Subtropical Moist Hill (Pine) • Subtropical Dry Evergreen
Montane Temperate Forests	<ul style="list-style-type: none"> • Montane Wet Temperate • Himalayan Moist Temperate • Himalayan Dry Temperate

Alpine Forests	<ul style="list-style-type: none"> • Sub-Alpine • Moist Alpine Scrub • Dry Alpine Scrub
----------------	--

- The Tropical Dry Evergreen Forests are found in the coastal parts of Tamilnadu. Here the annual average rainfall is 100 cms mostly received in the month of October-December from the North-East monsoon winds. The annual average temperature is about 28 degree centigrade and the humidity is 75 percent.

Q.24) Oak, Chestnut and Pine are the trees of which type of forests in India?

- a) Evergreen Forests
- b) Montane forests
- c) Tropical thorn forests
- d) Tropical deciduous forests

Q.24) Solution (b)

Basic Information:

Type of Forest	Tree Types
Tropical Evergreen Forests	Rosewood, Mahogany, Aini, Ebony
Tropical Deciduous Forests	Tendu, mahua, harra, amla, kusum, teak, sal, shisham, sandalwood
Tropical Thorn Forests	Babool, ber, date palm, khair, neem, khejri, palas
Montane forests	Oak, chestnut, chir pine, deodar, chinar, walnut, silver firs, junipers, birch

Q.25) Consider the following statements.

1. Tropical Dry Deciduous Forests occupy the highest percentage of the total forest cover in India.
2. Shola forests are found only in Western Ghats of Karnataka and Kerala.

Which of the following statements is/are correct?

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

Q.25) Solution (a)

Basic Information:

Percentage of forest cover by type of forest. (According to IFSR 2019)

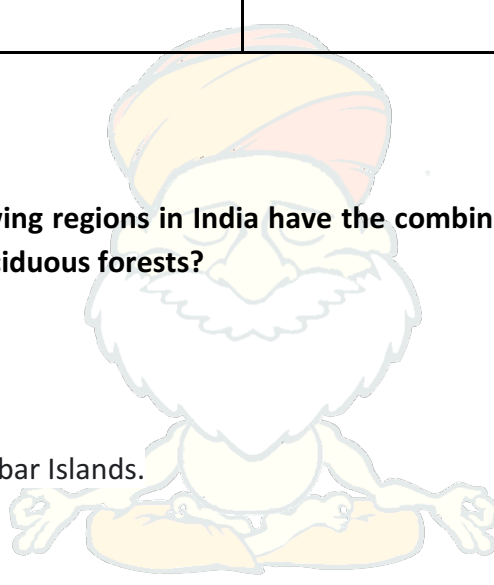
Sl No	Type of Forest	Percentage of the total area
1	Tropical Wet Evergreen	2.61
2	Tropical Semi-Evergreen	9.27
3	Tropical Moist Deciduous	17.65
4	Littoral and Swamp	0.73
5	Tropical Dry Evergreen	0.12
6	Tropical Dry Deciduous	40.86
7	Tropical Thorn	2.72

Sholas are the local name for patches of stunted tropical montane forest found in valleys amid rolling grassland in the higher montane regions of South India. These patches of shola forest are found mainly in the valleys and are usually separated from one another by undulating montane grassland.

Statement Analysis:

Statement 1	Statement 2
Correct	Incorrect
Tropical Dry Deciduous Forest occupies around 40.86 percent of the total forest area in the country which is the highest compared to all other forest types.	Shola forests are found in the higher elevation hill regions of the Nilgiris, Anaimalai, Munnar, Palni hills, Meghamalai, Agasthyamalai to the south and the Malnad and associated ranges in parts of Wayanad, Coorg, Baba Budangiri and Kudremukh up the north, in the states of Karnataka, Kerala and Tamil Nadu.

Q.26) Which of the following regions in India have the combination of Mangrove Forests, Evergreen forests and Deciduous forests?

- 
- a) Saurashtra
 - b) West Bengal.
 - c) Coastal Odisha
 - d) Andaman and Nicobar Islands.

Q.26) Solution (d)

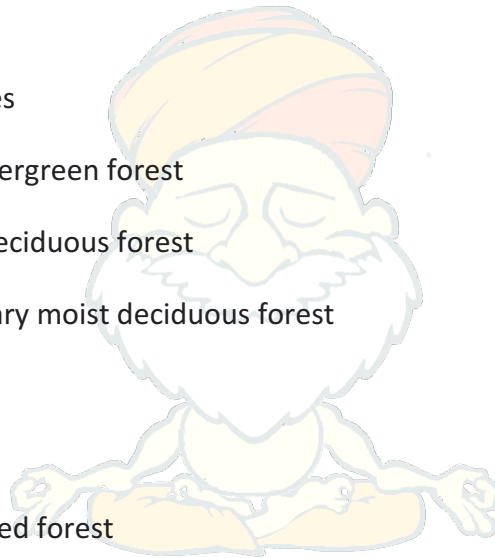
Basic Information:

- The Andaman and Nicobar Islands have a tropical rainforest canopy, made of a mixed flora with elements from Indian, Myanmar, Malaysian and endemic floral types.
- The South Andaman forests have a profuse growth of epiphytic vegetation, mostly ferns, and orchids.
- The Middle Andamans harbours mostly moist deciduous forests.
- North Andamans is characterised by the wet evergreen type, with plenty of woody climbers. The North Nicobar Islands are marked by the complete absence of

evergreen forests, while such forests form the dominant vegetation in the central and southern islands of the Nicobar group.

- Grasslands occur only in the Nicobars, and while deciduous forests are common in the Andamans, they are almost absent in the Nicobars.
- The present forest coverage is claimed to be 86.2% of the total land area.
- The forest coverage is made up of 12 types namely :

1. Giant evergreen forest
2. Andamans tropical evergreen forest
3. Southern hilltop tropical evergreen forest
4. Canebrakes
5. Wet bamboo brakes
6. Andamans semi-evergreen forest
7. Andamans moist deciduous forest
8. Andamans secondary moist deciduous forest
9. Littoral forest
10. Mangrove forest
11. Brackish water mixed forest
12. Submontane forest



Q.27) Arrange the following states in descending order in terms of their percentage of forest to the total geographical area of the state.

1. Arunachal Pradesh
2. Mizoram
3. Manipur
4. Meghalaya

Choose the correct option:

- a) 2-1-4-3

- b) 2-1-3-4
- c) 1-2-4-3
- d) 1-2-3-4

Q.27) Solution (a)**Basic Information:**

As per the Forest Survey of India report, the states and union territories with maximum percentage of forest cover to the geographical area are as follows.

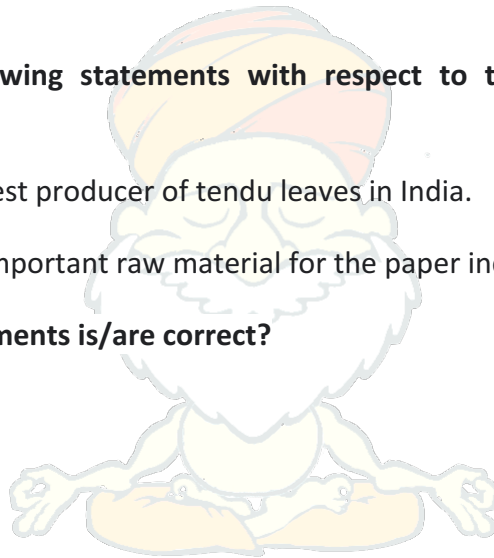
Area-wise Madhya Pradesh has the largest forest cover in the country followed by Arunachal Pradesh, Chhattisgarh, Odisha and Maharashtra. In terms of forest cover as percentage of total geographical area, the top five States are Mizoram (85.41%), Arunachal Pradesh (79.63%), Meghalaya (76.33%), Manipur (75.46%) and Nagaland (75.31%).

Q.28) Consider the following statements with respect to the minor forest produce. Madhya

1. Pradesh is the largest producer of tendu leaves in India.
2. Sabai is the most important raw material for the paper industry.

Which of the above statements is/are correct?

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

**Q.28) Solution (c)****Basic Information:****Tendu Leave:**

- Tendu is the most important type of forest leave used as wrappers for bidis. The tendu leaves grow in large numbers in Madhya Pradesh, Andhra Pradesh, Telangana, Bihar, Maharashtra, Gujarat, Rajasthan, Karnataka and Uttar Pradesh.
- Madhya Pradesh is the largest producer of tendu leaves in India followed by Bihar, Andhra Pradesh, Telangana and Maharashtra.

Sabai Grass:

- Grasses like Sabai, Bhabar and elephant are used for paper making.
- Sabai is the most important grass which provides the basic raw material for the paper industry.
- It is a perennial grass which grows on the bare slopes of the sub-himalayan tract and in Bihar, Odisha, West Bengal, Madhya Pradesh and western parts of Himachal Pradesh.

Q.29) Which of the following pairs are correctly matched?

Institute Name	Place
1. Institute of Arid Zone Forestry Research	Jodhpur
2. Institute of Rain and Moist Deciduous Forests	Jorhat
3. Forest Research Institute	Dehradun
4. Tropical Forestry Research Institute	Bengaluru

Choose the correct option:

- a) 1 and 2
- b) 2 and 3
- c) 1, 2, and 3
- d) All of the above.



Q.29) Solution (c)

Basic Information:

Institute Name	Place
Institute of Arid Zone Forestry Research	Jodhpur
Institute of Rain and Moist Deciduous Forests	Jorhat
Forest Research Institute	Dehradun

Tropical Forestry Research Institute	Jabalpur
Institute of Wood Science and Technology	Bengaluru
Institute of Forest Genetics and Tree Breeding	Coimbatore
Temperate Forest Research Centre	Shimla
Centre for Forest Productivity	Ranchi
Centre for Social Forestry and Environment	Allahabad

Q.30) With respect to the sacred groves in India, which of the following pairs are correctly matched?

Sacred Grove Local Name

State

- | | |
|---------------|--------------|
| 1. Devarakadu | Karnataka |
| 2. Kavu | Kerala |
| 3. Umang lai | Meghalaya |
| 4. Mandar | Chhattisgarh |

Choose the correct option:

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

Q.30) Solution (d)

Basic Information:

State	Local Name of Sacred Grove
Andhra Pradesh	Pavitrakshetralu

Arunachal Pradesh	Gumpa Forests
Assam	Than, Madaico
Chhattisgarh	Sarna, Mandar, Devlas, Budhadev
Haryana	Bani, Shamlat, Janglat
Himachal Pradesh	Dev Kothi, Devban
Jharkhand	Sarna
Karnataka	Devarakadu, Devkad
Kerala	Kavu
Manipur	Umang Lai
Meghalaya	Law Kyntang, Law lyngdoh
Orissa	Jahera, Thakuramma
Puducherry	Kovil kadu
Uttarakhand	DevBhumi
West bengal	Garamthan, Harithan, Jahera, Sabitrithan, Santalburithan.

Q.31) Consider the following statements with respect to the protected area network in India.

1. Only the Central government can notify the national parks in India.
2. Wildlife sanctuaries boundaries are not fixed by legislation in India

3. National Parks are primarily focused on a particular species in India.

Which of the above statements is/are correct?

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

Q.31) Solution (a)

Basic Information:

National Parks:

- An area, whether within a sanctuary or not, can be notified by the state government to be constituted as a National Park, by reason of its ecological, faunal, floral, geomorphological, or zoological association or importance, needed to for the purpose of protecting & propagating or developing wildlife therein or its environment.
- No human activity is permitted inside the national park except for the ones permitted by the Chief Wildlife Warden of the state under the conditions given in CHAPTER IV, WPA 1972.
- There are 104 existing national parks in India covering an area of 40501.13 km², which is 1.23% of the geographical area of the country (National Wildlife Database, May, 2019).

Wildlife Sanctuary:

- Any area other than an area comprising any reserve forest or the territorial waters can be notified by the State Government to constitute as a sanctuary if such area is of adequate ecological, faunal, floral, geomorphological, natural. or zoological significance, for the purpose of protecting, propagating or developing wildlife or its environment.
- Some restricted human activities are allowed inside the Sanctuary area details of which are given in CHAPTER IV, WPA 1972.
- There are 551 existing wildlife sanctuaries in India covering an area of 119775.80 km², which is 3.64 % of the geographical area of the country (National Wildlife Database, May, 2019).

Biosphere Reserves:

- Biosphere reserves are sites established by countries and recognized under UNESCO's Man and the Biosphere (MAB) Programme to promote sustainable development based on local community efforts and sound science.
- The programme of Biosphere Reserve was initiated by UNESCO in 1971.
- The purpose of the formation of the biosphere reserve is to conserve in situ all forms of life, along with its support system, in its totality, so that it could serve as a referral system for monitoring and evaluating changes in natural ecosystems.
- Presently, there are 18 notified biosphere reserves in India.

Statement Analysis:

Statement 1	Statement 2	Statement 3
Incorrect	Correct	Incorrect
In India, state governments notify the formation of National parks. Under special circumstances central government too notify the National parks.	Unlike National parks and biosphere reserves, the boundaries of wildlife sanctuary are not sacrosanct or fixed.	National parks are not necessarily focused on the conservation of particular species. Rather wildlife sanctuaries are dedicated for protection and conservation of particular species.

Q.32) Which of the following countries is the largest producer of wood pulp in the world?

- USA
- Brazil
- Canada
- Argentina

Q.32) Solution (c)

Basic Information:

- Wood pulp is the basic raw material for the paper industry.
- The timber resources used to make wood pulp are referred to as pulpwood.

- Coniferous trees are preferred for making wood pulp because the cellulose fibers in the pulp of these species are longer, and therefore make stronger paper.
- Some of the most commonly used softwood trees for paper making include spruce, pine, fir, larch and hemlock, and hardwoods such as eucalyptus, aspen and birch.
- Canada is the largest producer of wood pulp globally due to the presence of large areas of coniferous forests in the country.

Q.33) Arrange the following soil groups in the order of their land area coverage starting from the highest to the lowest in India.

1. Laterite soil
2. Black Soil
3. Alluvial Soil.
4. Red soil.

Choose the correct option:

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



Q.33) Solution (b)

Basic Information:

The Indian Council of Agricultural Research has divided soils in India into eight major groups.

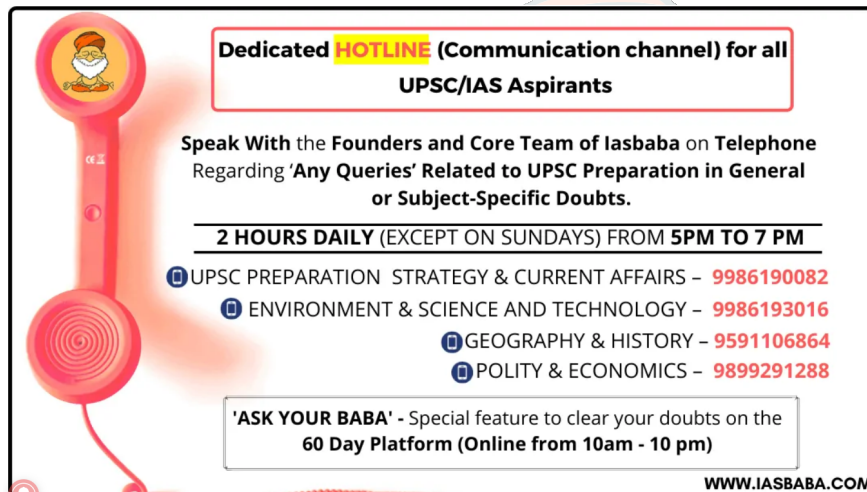
Soil groups by percentage of area are provided below.

Major Soil Group	Percentage of land area
Alluvial Soil	45.6
Red Soil	18.6
Black Soil	16.6
Laterite Soil	7.26

Forest and Mountain soil	8.67
Arid and desert soil	4.32

Q.34) 'Usar', 'Kallar', 'thur' and 'rakar' are local names given to which of the following soil groups?

- a) Saline and Alkaline soil
- b) Peaty and marshy Soil.
- c) Laterite soil
- d) Desert soil



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Q.34) Solution (a)

Basic Information:

- Saline and Alkaline soils are found in Andhra Pradesh, Telangana and karnataka. These are also found in the drier parts of Bihar, Uttar

Pradesh, Haryana, Punjab and Maharashtra.

- These soils are known by different names locally like 'Reh', 'Kallar', 'Usar', 'Thur', 'Rakar', 'Karl' and 'Chopan'.
- The accumulation of these salts and alkali materials makes soil infertile and renders it unfit for agriculture.

Q.35) The old and new alluvial deposits of the northern plains are called by which names respectively?

- a) Khadar and Bhangar
- b) Bhangar and Khadar
- c) Bhabar and Tarai
- d) Tarai and Khadar

Q.35) Solution (b)

Basic Information:

- The northern plains are formed by the alluvial plains brought down by the rivers like Indus, Ganga and Brahmaputra.
- The plains are divided into Bhabar, Tarai and alluvial plains. The alluvial plains are further divided into Khadar (New deposits) and Bhangar (Old Deposits).
- Bhabar is a narrow belt ranging between 8-10 kms parallel to the Shiwalik Foothills at the break up of the slope.
- Tarai is a marshy, swampy belt below the Bhabar belt.
- South of Tarai are the alluvial plains consisting of Old deposits (Bhangar) and new deposits (Khadar).

Q.36) Consider the following statements with respect to the composition of soils in India.

1. Red soils are rich in potash but poor in lime and nitrogen.
2. The porosity of alluvial soil helps in good agriculture production.
3. Black soil is highly argillaceous with large clay content.

Which among the above statements is/are correct?

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

d) 1, 2 and 3

Q.36) Solution (d)

Basic Information:

Characteristics of major soils in India:

Alluvial Soils:

- They are immature and have weak profiles due to their recent origin.
- Most of the soil is Sandy and clayey soils are not uncommon.
- The soil is porous because of its loamy (equal proportion of sand and clay) nature.
- Porosity and texture provide good drainage and other conditions favorable for agriculture.
- The proportion of nitrogen is generally low.
- The proportion of Potash, phosphoric acid and alkalis are adequate.

Black Soils:

- Black soil is highly argillaceous [Geology (of rocks or sediment) consisting of or containing clay] with a large clay factor, 62 per cent or more.
- The black soil is highly retentive of moisture.
- 10 percent of alumina,
- 9-10 percent of iron oxide,
- 6-8 percent of lime and magnesium carbonates,
- Potash is variable (less than 0.5 per cent) and
- phosphates, nitrogen and humus are low.

Red Soils:

- The colour is mainly due to the diffusion of the ferric oxide.
- It is deficient in lime, phosphate, manganese, nitrogen, humus.
- Rich in potash.
- Texture is sandy to clay and loamy.

Laterite soils:

- Formed due to the leaching process.
- It is rich in Iron and Aluminum.
- But deficient in Nitrogen, Potash, Potassium, Lime, Humus.

Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	Correct	Correct
Red soils are rich in potash but poor in lime and magnesia	It is due to the porosity and good texture that makes the alluvial soil good for agriculture	The high argillaceous nature and clay content of the black soil makes it highly water retentive.

Q.37) Consider the following pairs with respect to coal fields in India.

<u>Coal field</u>	<u>State</u>
1. Korba	Jharkhand.
2. Raniganj	Chhattisgarh
3. Bokaro	Jharkhand
4. Talcher	Orissa.

Which of the above is/are correctly matched?

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

Q.37) Solution (c)

Basic Information:

State	Coalfield

West Bengal	Ranigunj
Chhattisgarh	Korba, Hasdeo-Arand, Sonhat, Jhilmil
Jharkhand	Dhanbad, Ramgarh, Daltonganj, Jharia, Bokaro, Giridih, Karanpura.
Madhya Pradesh	Singrauli, Umaria, Satpura, Johila
Andhra Pradesh	Singareni, Katanpalli
Tamilnadu	Neyveli
Odisha	Talcher, Himgiri, Rampur
Assam	Makum, Najira, Janji

Q.38) Consider the following statements with respect to non-conventional sources of energy.

1. In India, shale gas reserves are found in Krishna-Godavari basin and Cambay basin only.
2. In India, Natural Gas hydrates are found in Krishna-Godavari basin only.

Which of the above statements is/are correct?

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

Q.38) Solution (d)

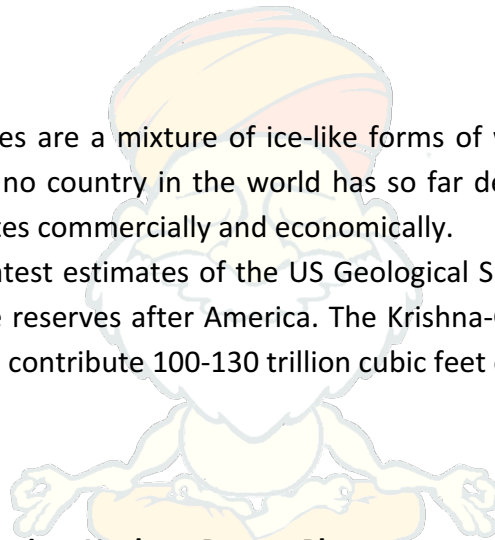
Basic Information:

Shale Gas:

- Shale gas is found in unconventional reservoirs typically trapped in shale rock, having low permeability, originally deposited as clay and silt.
- The technique used for shale gas production requires first drilling a vertical well to the targeted rock followed by horizontal drilling exposing the well to more of producing shale. This process is called Hydraulic Fracturing or Fracking, in which water, chemicals and sand are pumped at high pressure into the well to unlock the gas trapped in shale rocks by opening cracks or fractures in the rock and allowing gas to flow from shale into the well and onto the surface.
- Shale gas is cleaner burning than coal and crude oil. The combustion of shale gas emits significantly lower levels of key pollutants including carbon dioxide, nitrogen oxide and sulphur dioxide than the combustion of coal and oil.
- Shale gas resources in India are found in Krishna-Godavari basin, Cambay basin, Cauvery basin, Assam Arakan basin and Gondwana basin.
- The commercial extraction is yet to start.

Natural Gas Hydrate:

- Natural gas hydrates are a mixture of ice-like forms of water and gas in molecular cavities. However, no country in the world has so far developed the technology to produce gas hydrates commercially and economically.
- According to the latest estimates of the US Geological Survey, India has the second largest gas hydrate reserves after America. The Krishna-Godavari (KG), Cauvery and Kerala basins alone contribute 100-130 trillion cubic feet of estimated reserves.



Q.39) Which of the following Nuclear Power Plants are correctly matched with their location?

<u>Nuclear Power Plants</u>	<u>State</u>
1. Kakrapar	Gujarat
2. Kovvada	Kerala
3. Jaitapur	Maharashtra
4. Mithi Viridi	Maharashtra

Choose the correct option:

- 1 and 3 only
- 1 and 4 only
- 1 and 2 only
- All of the above.

Q.39) Solution (a)**Basic Information:****List of Nuclear Power Plants in India**

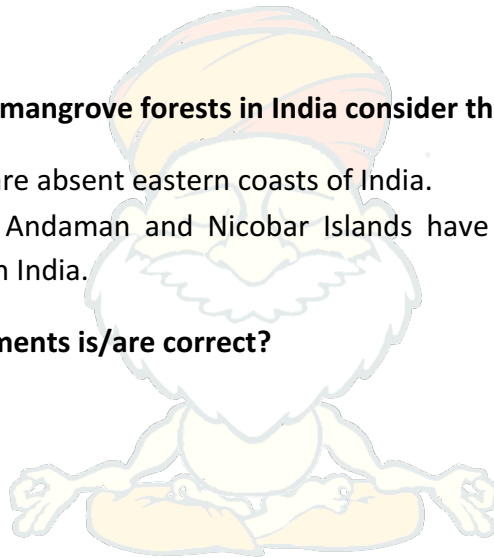
1. Rawatbhata in Rajasthan
2. Kakrapar and Mithi Virdi in Gujarat
3. Tarapur and Jaitapur in Maharashtra
4. Kaiga in Karnataka
5. Kalpakkam and Kudankulam in Tamil Nadu
6. Kovvada in Andhra Pradesh
7. Haripur in West Bengal
8. Narora in Uttar Pradesh

Q.40) With respect to the mangrove forests in India consider the following statements.

1. Mangrove forests are absent eastern coasts of India.
2. After Sunderbans, Andaman and Nicobar Islands have the highest percentage of mangrove forests in India.

Which of the above statements is/are correct?

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

**Q.40) Solution (d)****Basic Information:****Mangrove Forests:**

- A mangrove is a shrub or small tree that grows in coastal saline or brackish water.
- Mangroves are salt-tolerant trees, also called halophytes, and are adapted to life in harsh coastal conditions.
- They contain a complex salt filtration system and complex root system to cope with salt water immersion and wave action. They are adapted to the low oxygen conditions of waterlogged mud.

- They are typically evergreen land plants growing on sheltered shores, typically on tidal flats, deltas, estuaries, bays and creeks.
- The best locations are where abundant silt is available.
- Their physiological adaptation to salinity stress and to water logged anaerobic mud is high.
- It produces pneumatophores (blind roots) to overcome respiratory problems in anaerobic soil conditions.
- Mangroves enhance the natural recycling of nutrients.

Statement Analysis:

Statement 1	Statement 2
Incorrect	Incorrect
Mangroves are found in eastern coast too. In Gujarat mangroves like <i>Avicennia marina</i> , <i>Avicennia Officinalis</i> and <i>Rhizophora mucronata</i> are found mainly in the Gulf of Kachchh and the Kori Creek.	The mangroves of Bhitarkanika (Orissa) are the second largest after the Sunderbans in West - Bengal.

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