Q.1) With respect to the ocean salinity, consider the following statements:

1. Ocean salinity influences the composition and movement of the sea water and the distribution of fish and other marine resources.
2. In the estuaries and the Arctic, the salinity is more than the land locked red sea.
3. The salinity variation in the Pacific Ocean is mainly due to its shape and larger areal extent.
4. The low salinity trend is observed in the Bay of Bengal due to influx of river water by the river Ganga.
5. The Arabian Sea shows higher salinity as compared to Bay of Bengal due to high evaporation and low influx of fresh water.

Which of the above statements are correct?

a) Only 1,2,3,4
b) Only 2,3,4,5
c) Only 1,3,4,5
d) Only 1,2,4,5

Q.1) Solution (c)

Explanation:

Salinity is the term used to define the total content of dissolved salts in seawater. It is calculated as the amount of salt (in gm) dissolved in 1,000 gm (1 kg) of seawater. Salinity determines compressibility, thermal expansion, and temperature, and density, absorption of insolation, evaporation and humidity. It also influences the composition and movement of the sea: water and the distribution of fish and other marine resources.

In the land locked Red Sea, it is as high as 41. In hot and dry regions, where evaporation is high, the salinity sometimes reaches to 70. Comparatively Low salinity regions in the estuaries and the Arctic, the salinity fluctuates from 0 – 35.

Q.2) Consider the following statements regarding the sources of Heat in Oceans:

1. The ocean is heated by the inner heat of the ocean itself (earth's interior is hot).
2. The sun is the principal sources of energy (Insolation).
3. At the sea surface, the crust is only about 5 to 30 km thick, therefore the inner heat is more as compared to that received from sun.

Which of the above statements are correct?

a) Only 1
b) Only 1,2
c) Only 2,3
d) All of the above

Q.2) Solution (b)

Explanation:

The sun is the principal source of energy of energy in oceans. The ocean is also heated by the inner heat of the ocean itself (earth's interior is hot. At the sea surface, the crust is only about 5 to 30 km thick). But this heat is negligible compared to that received from sun.

Q.3) How does deep water marine organisms survive in spite of absence of sunlight?

1. At the sea bottom, there are bacteria that make use of heat supplied by earth's interior to prepare food. So, they are the primary producers.
2. Other organisms feed on these primary producers and subsequent secondary producers.

Which of the above statements are correct?

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

Q.3) Solution (c)

Explanation:

Photic zone is only about few hundred meters. It depends on lot of factors like turbidity, presence of algae etc. There are no enough primary producers below few hundred meters till the ocean bottom.

At the sea bottom, there are bacteria that make use of heat supplied by earth's interior to prepare food. So, they are the primary producers. Other organisms feed on these primary producers and subsequent secondary producers. So, the heat from earth supports wide ranging deep water marine organisms. But the productivity is too low compared to ocean surface.

Q.4) Consider the following statements:

1. Diurnal range of ocean temperatures is too high.
2. The process of heating and cooling of the oceanic water is slower than land due to vertical and horizontal mixing and high specific heat of water and high specific heat of water.

Which of the above statements are correct?

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

Q.4) Solution (b)

Explanation:

The diurnal range of ocean temperatures is too small and oceans takes more time to heat or cool. The process of heating and cooling of the oceanic water is slower than land due to vertical and horizontal mixing and high specific heat of water.(More time required to heat up a Kg of water compared to heating the same unit of a solid at same temperatures and with equal energy supply).

Q.5) Consider the following statements:

1. Boiling point of the sea water is decreased in the case of higher salinity.
2. Evaporation of sea water increased with increase in salinity.

Which of the above statements are correct?

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

Q.5) Solution (d)

Explanation:

Boiling point of the sea water is increased in the case of higher salinity and hence evaporation is decreased with increased boiling point and vice versa.
[Salinity increased = Boiling point increased = Evaporation decreased].

Q.6) Consider the following statements

1. Waters of high salinity are denser than water of lower salinity.
2. Water of low salinity flows on the surface of water of high salinity.

Which of the above statements are correct?

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

Q.6) Solution (c)

Explanation:

Waters of high salinity are denser than water of lower salinity. Therefore water of low salinity flows on the surface of water of high salinity and vice versa.
Example: The less saline water of Atlantic(open) flows in the surface into the Mediterranean(which is partially closed), and this is compensated for by and outflow of denser bottom water from the Mediterranean(as it's partially closed).

Q.7) Consider the following statements regarding the oceanic deposits of the ocean floor:

1. Oozes include terrigenous deposits as they are derived from ocean.
2. The muds include pelagic deposit as they are derived from land and are mainly deposited on the continental shelves.
3. The clays occur mainly as red clays in the deeper part of the ocean basins and are particularly abundant in Atlantic Ocean

Which of the above statements are incorrect?

a) Only 1,2
b) Only 1,3
c) Only 2,3
d) All of the above

Q.7) Solution (d)

Explanation:

Generally oceanic deposit can be classified as muds, clays and oozes. Oozes includes pelagic (not terrigenous) deposits as they are derived from ocean.
The muds include terrigenous (not pelagic) deposit as they are derived from land and are mainly deposited on the continental shelves. The clays occur mainly as red clays in the deeper part of the ocean basins and are particularly abundant in pacific (not Atlantic) Ocean .

Q.8) Consider the following statements regarding the temperature of the Ocean water:

1. The Norwegian coast, even at latitude 60-70 degrees north, is ice free throughout the year.
2. It is so because mountains block the warm west winds from the sea.

Which of the above statements are correct?

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

Q.8) Solution (a)

Explanation:

Snow that falls along the coast melts often immediately. The warm North Atlantic Current of the Gulf Stream (not the mountain) keeps nearly all the seaports ice-free, even in the northern regions. During winter, Norway's inland regions are colder than the coast because mountains block the warm west winds from the sea. But it doesn't keep seaports ice free. It just keep the coast comparatively warmer than inland.

Q.9) Consider the following statements:

1. The latitudinally extensive seas in low latitude regions have warmer surface water than longitudinally extensive sea.
2. Mediterranean Sea records higher temperature than the longitudinally extensive Gulf of California.

Which of the above statements are correct?

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

Q.9) Solution (c)

Explanation:

The latitudinally extensive seas (Mediterranean sea) have warmer surface water than longitudinally extensive sea(gulf of California).

Q.10) Consider the following statements regarding the wind system near Peruvian coast:

1. The onshore winds (winds flowing from oceans into continents) pile up warm water near the coast and this raises the temperature near Peruvian coast during normal conditions.
2. The winds blowing from the land towards the oceans (off-shore winds-moving away from the shore) drive warm surface water away from the coast resulting in the upwelling of cold water from below. This happens near Peruvian Coast during El-Nino).

Which of the above statements are correct?

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

Q.10) Solution (d)

Explanation:

Prevalent winds generate horizontal and sometimes vertical ocean currents: The winds blowing from the land towards the oceans (off-shore winds-moving away from the shore) drive warm surface water away from the coast resulting in the upwelling of cold water from below (This happens near Peruvian Coast in normal years. El-Nino).

Contrary to this, the onshore winds (winds flowing from oceans into continents) pile up warm water near the coast and this raises the temperature (This happens near the Peruvian coast during El Nino event)(In normal years, North-eastern Australia and Western Indonesian islands see this kind of warm ocean waters due to Walker Cell or Walker Circulation).

Q.11) Consider the following statements regarding the vertical temperature distribution of ocean:

1. About 90 per cent of the total volume of water is found below the thermocline in the deep ocean.
2. The rate of decrease of temperature with depths is greater at the equator than at the poles.
3. In cold Arctic and Antarctic regions, sinking of cold water and its movement towards lower latitudes is observed.
4. In equatorial regions the surface, water sometimes exhibits lower temperature and salinity due to high rainfall, whereas the layers below it have higher temperatures.
5. The enclosed seas of low latitudes like the Sargasso Sea, the Red Sea and the Mediterranean Sea have high bottom temperatures due to high insolation throughout the year and lesser mixing of the warm and cold' waters.

Which of the above statements are correct?

a) Only 1,3,4,5
b) Only 1,2,4,5
c) Only 2,3,4,5
d) All of the above

Q.11) Solution (d)
Explanation:

The rate of decrease of temperature with depths is greater at the equator than at the poles.

The surface temperature and its downward decrease is influenced by the upwelling of bottom water (Near Peruvian coast during normal years).In cold Arctic and Antarctic regions, sinking of cold water and its movement towards lower latitudes is observed.

In equatorial regions the surface, water sometimes exhibits lower temperature and salinity due to high rainfall, whereas the layers below it have higher temperatures.The enclosed seas in both the lower and higher latitudes record higher temperatures at the bottom.

The enclosed seas of low latitudes like the Sargasso Sea, the Red Sea and the Mediterranean Sea have high bottom temperatures due to high insolation throughout the year and lesser mixing of the warm and cold' waters.

In the case of the high latitude enclosed seas, the bottom layers of water are warmer as water of slightly higher salinity and temperature moves from outer ocean as a sub-surface current. The presence of submarine barriers may lead to different temperature conditions on the two sides of the barrier. For example, at the Strait of Bab-el-Mandeb, the submarine barrier (sill) has a height of about 366 m. The subsurface water in the strait is at high temperature compared to water at same level in Indian Ocean. The temperature difference is greater than nearly 20° C.

Q.12) Consider the following statements regarding the horizontal distribution of temperature of ocean:

1. The average temperature of surface water of the oceans is about 27°C and it gradually decreases from the poles towards the equator.
2. The rate of decrease of temperature with increasing latitude is generally 0.5°C per latitude.
3. The horizontal temperature distribution is shown by isothermal lines, i.e., lines joining places of equal pressure.
4. Isotherms are closely spaced when the temperature difference is high and vice versa.

Which of the above statements are correct?

a) Only 1,2,3
b) Only 2,4
c) Only 1,2,4
d) All of the above

Q.12) Solution (b)
Explanation:

The average temperature of surface water of the oceans is about 27°C and it gradually decreases from the equator towards the poles.

The rate of decrease of temperature with increasing latitude is generally 0.5°C per latitude. The horizontal temperature distribution is shown by isothermal lines, i.e., lines joining places of equal temperature. Isotherms are closely spaced when the temperature difference is high and vice versa.

Q.13) Consider the following statements regarding the coral reef:

1. Small marine plants (algae) also deposit calcium carbonate contributing to coral growth.
2. When the coral polyps die, they shed their skeleton [coral] on which new polyps grow.
3. Polyps are deep water organisms which have a soft body covered by a calcareous skeleton.

Which of the above statements are incorrect?

a) Only 1
b) Only 1 and 2
c) Only 3
d) None

Q.13) Solution (c)

Explanation: corals are shallow water organisms' not deep water.

Q.14) Consider the following statements about coral reefs relief features:

1. Fringing reef, barrier reef and atoll (coral islands are formed on atolls) are the most important relief features.
2. Barrier reef is the largest (in distribution) of the three reefs, runs for hundreds of kilometres and is several kilometres wide.
3. Fringing reef is by far the most common of the three major types of coral reefs, with numerous examples in all major regions of coral reef development.
4. Fringing reef is the largest in size of the three reef.

Which of the above statements are correct?

a) Only 1,3
b) Only 1,2
c) Only 1,2,3

d) All of the above

Q.14) Solution (a)

Explanation:

Statement 2 is wrong because Barrier reef is the largest (in size not distribution) of the three reefs, runs for hundreds of kilometres and is several kilometres wide.
Statement 4 is wrong because barrier reef (not fringing)is the largest in size of the three reef.

Q.15) Consider the following statements regarding the Atoll:

1. An Atoll is a roughly circular (annular) oceanic reef system surrounding a large (and often deep) central lagoon.
2. Atolls are located at great distances from deep see platforms, where the submarine features may help in formation of atolls, such as a submerged island or a volcanic cone which may reach a level suitable for coral growth.
3. A coral island or an atoll island which is, in fact, an atoll reef, built by the process of erosion and deposition of waves with island crowns formed on them.

Which of the above statements are correct?

a) Only 1,2
b) Only 2,3
c) Only 1,3
d) All of the above

Q.15) Solution (d)

Explanation:

All statements are self explanatory and correct.

Extra information:

An atoll may have any one of the following three forms:

- true atoll—a circular reef enclosing a lagoon with no island;
- an atoll surrounding a lagoon with an island;

- a coral island or an atoll island which is, in fact, an atoll reef, built by the process of erosion and deposition of waves with island crowns formed on them. Atolls are far more common in the Pacific than any other ocean.

Q.16) Consider the following statements regarding the Chilika lake:

1. Chilika Lake have 20% of India's seagrass distribution, which plays a vital role in oxygen production and absorption of carbon dioxide and acts as a purifier in aquatic ecology.
2. The seagrass area increases only when the water is clean.

Which of the above statements are correct?

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

Q.16) Solution (c)

Explanation:

Chilika Lake is claimed to have 20% of India's seagrass distribution, which plays a vital role in oxygen production and absorption of carbon dioxide and acts as a purifier in aquatic ecology.

"Seagrass plays a vital role in oxygen production and absorption of carbon dioxide. It acts as a purifier in aquatic ecology. The seagrass area increases only when the water is clean. Seagrass will rejuvenate fishing ground by providing nursery habitat to important fish species.

Extra information: Proposed water aerodrome in Chilika Lake likely to face green hurdle is in news (read about that also)

Q.17) Consider the following statements regarding the Siachen glacier:

1. Siachen glacier is the longest glacier in the Karakorum.
2. It is world's second longest non-polar glacier.
3. World's highest battlefield.
4. It is largest single source of freshwater in the Indian subcontinent.

Which of the following statements are correct?

a) Only 1,2,3
b) Only 1,2,4

c) Only 2,3,4
d) All of the above

Q.17) Solution (d)

Explanation: Self explanatory.

Extra information:

It is located in the eastern Karakoram Range in the Himalaya Mountains. It is source of Nubra River that eventually feeds the mighty Indus. Siachen is near the Karakoram pass, forming almost a triangle with India, China and territory occupied by Pakistan touching the edges.

Fedchenko Glacier in Tajikistan, is the world's largest non-polar glacier.

Lambert-Fisher Glacier in Antarctica is world's largest glacier.

Q.18) Consider the following statements regarding the coral bleaching:

1. Coral bleaching is the loss of intracellular endosymbionts through either expulsion or loss of algal pigmentation.
2. Increased solar radiation, excess oxygenation,acidification etc are among the causes of coral bleaching.

Which of the following statements are correct?

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

Q.18) Solution (a)

Explanation:

Oxygen starvation (not increased oxygenation) caused by an increase in zooplankton levels as a result of overfishing is the cause of coral bleaching. Other reasons include both biotic and abiotic factors as cause for coral bleaching. They include:

- Increased or reduced water temperatures.
- Oxygen starvation caused by an increase in zooplankton levels as a result of overfishing.
- Increased solar irradiance (photosynthetically active radiation and ultraviolet band light).
- Changes in water chemistry (in particular acidification).
- Increased sedimentation (due to silt runoff).
- Bacterial infections.
- Coral eating crown of thorns starfish
- Changes in salinity.
- Cyanide fishing.
- Elevated sea levels due to global warming.
- Mineral dust from African dust storms caused by drought.

Q.19) The Great Artesian Basin, one of the largest and deepest underground water reservoirs in the world is located in?

a) Australia
b) Germany
c) Russia
d) Canada

Q.19) Solution (a)

Explanation: The Great Artesian Basin (Australia) is one of the largest underground water reservoirs in the world. It underlies approximately 22 per cent of Australia.

Q.20) Israeli researchers have found which animal to be useful in allowing them to detect and analyse waste and its impact in various regions?

a) Sea anemone
b) Sea squirt
c) Ascidian
d) Both sea squirt and ascidian

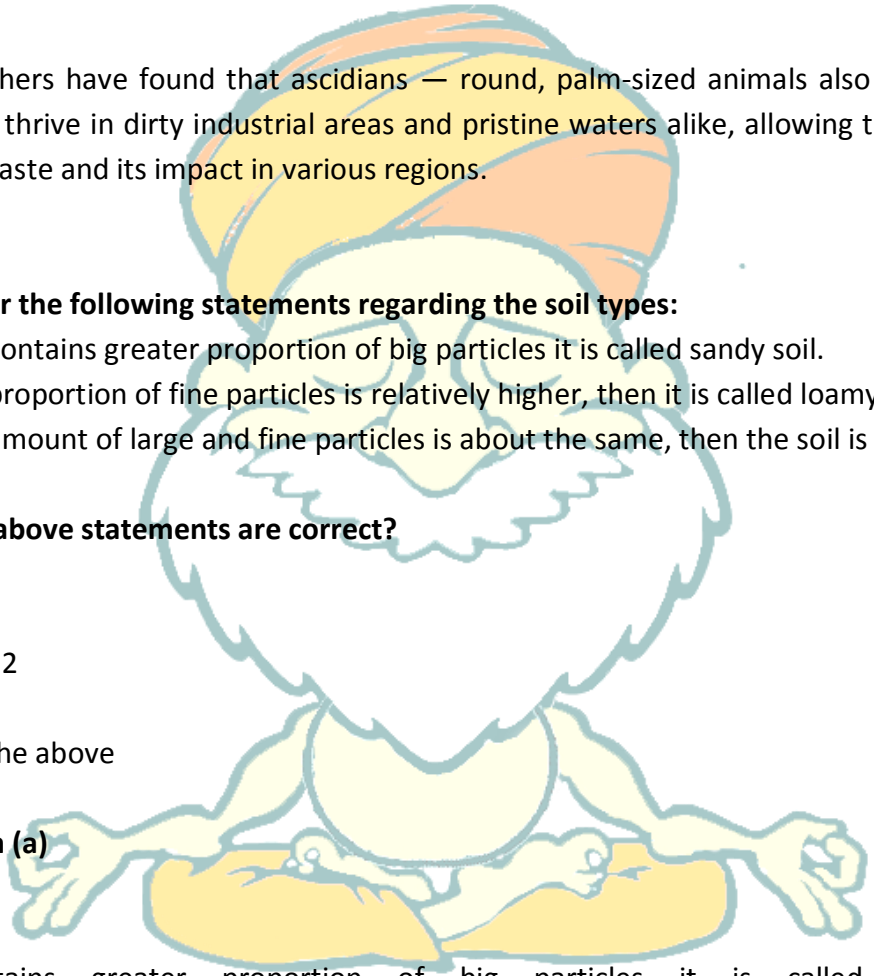
Q.20) Solution (d)

Explanation:

As per the Israel researchers, the sea squirt, can suck up plastic particles from the sea and can filter particles from ocean and store them in its tissue.

A rubbery sea creature with an irritating habit of clinging to ships and invading beaches could help measure plastic pollution as it can filter tiny particles from the ocean and store them in its soft tissue.

Israeli researchers have found that ascidians — round, palm-sized animals also known as sea squirts — can thrive in dirty industrial areas and pristine waters alike, allowing them to detect and analyse waste and its impact in various regions.



Q.21) Consider the following statements regarding the soil types:

1. If soil contains greater proportion of big particles it is called sandy soil.
2. If the proportion of fine particles is relatively higher, then it is called loamy soil.
3. If the amount of large and fine particles is about the same, then the soil is called clayey.

Which of the above statements are correct?

a) Only 1
b) Only1, 2
c) Only 3
d) All of the above

Q.21) Solution (a)
Explanation:

If soil contains greater proportion of big particles it is called sandy soil. If the proportion of fine particles is relatively higher, then it is called clayey soil. If the amount of large and fine particles is about the same, then the soil is called loamy.

Q.22) Consider the following statements regarding the soil and their types:

1. Sandy soils have little air but they are heavy as they hold more water than the clay soils.

2. The best topsoil for growing plants is Loamy soil is a mixture of sand, clay and another type of soil particle known as silt.
3. Silt occurs as a deposit in river beds and it particles size is larger than those of sand and clay.
4. The loamy soil has humus in it and has the right water holding capacity for the growth of plants.

Which of the above statements are incorrect?

a) Only 1,2
b) Only 1,3
c) Only 1,4
d) Only 2,3

Q.22) Solution (b)

Note: Incorrect options have been asked.
Explanation:

Clay soils have little air but they are heavy as they hold more water than the sandy soils.
Silt occurs as a deposit in river beds and it particles size is between those of sand and clay.

Q.23) Consider the following statements:

1. Clayey and loamy soils are both suitable for growing cereals like tea and coffee as these soils can't retain water.
2. For lentils (masoor) and other pulses, soils rich in clay and organic matter and having a good capacity to retain water are ideal.
3. For paddy (rice) loamy soils, which drain water easily, are required.
4. For cotton, sandy loam or loam, which drain water easily and can hold plenty of air, are more suitable.

Which of the above statements are incorrect?

a) Only 1,2,3
b) Only 1,2,4
c) Only 2,3,4
d) Only 1,3,4

Q.23) Solution (a)

Explanation:

Clayey and loamy soils are both suitable for growing cereals like wheat, and gram. Such soils are good at retaining water.
For paddy, soils rich in clay and organic matter and having a good capacity to retain water are ideal.
For lentils (masoor) and other pulses, loamy soils, which drain water easily, are required.

Q.24) Consider the following statements regarding the soil profile:

1. The A-horizon is generally dark in colour as it is rich in humus and minerals.
2. The C-horizon is generally harder and more compact.
3. The B-horizon is made up of small lumps of rocks with cracks

Which of the above statements are correct?

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

Q.24) Solution (a)

Explanation:

The uppermost horizon is generally dark in colour as it is rich in humus and minerals. The humus makes the soil fertile and provides nutrients to growing plants. This layer is generally soft, porous and can retain more water. It is called the topsoil or the A-horizon.
The next layer has a lesser amount of humus but more of minerals. This layer is generally harder and more compact and is called the B-horizon or the middle layer. The third layer is the C-horizon, which is made up of small lumps of rocks with cracks.

Q.25) Consider the following statements regarding the factors that influence soil formation in Indian condition:

1. In most of the cases, the parent material determines the colouration, mineral composition and texture of the soil.
2. The rocks from which soils are formed are called parent materials.
3. The soil formed is always having the same physical properties of the parent rock.

Which of the above statements are correct?

a) Only 1,2
b) Only 2,3
c) Only 1,3
d) All of the above

Q.25) Solution (a)

Explanation:

In some cases, the soil formed may or may not have the same physical properties of the parent rock.

Climatic factors induce chemical changes which also affect physical properties of the soil. The surface rocks are exposed to the process of weathering. In this process, the rocks are converted into fine grains and provide a base for the soil formation.

Q.26) Consider the following statements regarding the Gondwana rocks:

1. These rocks are also sedimentary in nature and they are much older.
2. On weathering they give rise to comparatively more mature soils.
3. The soil is more or less of uniform character but of high fertility.

Which of the above statements are incorrect?

a) Only 1,2
b) Only 2,3
c) Only 1,3
d) All of the above

Q.26) Solution (d)

Explanation:

Gondwana rocks are sedimentary in nature and they are much younger. On weathering they give rise to comparatively less mature soils. The soil is more or less of uniform character but of low fertility.

Q.27) Consider the following statements regarding the Deccan Basalts:

1. Volcanic outburst over a vast area of the Peninsular India many hundred million years ago gave rise to Deccan Traps.
2. Basaltic lava flowed out of fissures covering a vast area of about ten lakh sq km.
3. The weathering of these rocks has given rise to soils of darker colour.
4. The soil is fertile with high moisture holding capacity and is popularly known as 'regur' or black cotton soil.

Which of the above statements are correct?

a) Only 1,2,3
b) Only 2,3,4
c) Only 1,3,4
d) All of the above

Q.27) Solution (d)

Explanation:

Volcanic outburst over a vast area of the Peninsular India many hundred million years ago gave rise to Deccan Traps.
Basaltic lava flowed out of fissures covering a vast area of about ten lakh sq km. Basalts are rich in titanium, magnetite, aluminium and magnesium. Consequently the weathering of these rocks has given rise to soils of darker colour. The soil is fertile with high moisture holding capacity and is popularly known as 'regur' or black cotton soil.

Q.28) Consider the following statements regarding the Red Soil:

1. Red soils along with its minor groups form the largest soil group of India.
2. The main parent rocks are crystalline and metamorphic rocks like acid granites, gneisses and quartzites
3. They are basic mainly due to the nature of the parent rocks. The alkali content is fair.
4. They are fairly rich in phosphorus and potassium.

Which of the above statements are correct?

a) Only 1,2
b) Only 1,3,4
c) Only 2,3,4
d) All of the above

Q.28) Solution (a)

Explanation:

Red soils along with its minor groups form the largest soil group of India. The main parent rocks are crystalline and metamorphic rocks like acid granites, gneisses and quartzites.

Characteristics of Red Soils:

The texture of these soils can vary from sand to clay, the majority being loams. On the uplands, the red soils are poor, gravelly, and porous. But in the lower areas they are rich, deep dark and fertile.

Chemical Composition of Red Soils:

They are acidic mainly due to the nature of the parent rocks. The alkali content is fair. They are poor in lime, magnesia, phosphates, nitrogen and humus. They are fairly rich in potash and potassium.

Q.29) Consider the following statements:

1. Laterite soils are mostly the end products of weathering.
2. They are formed under conditions of low temperature and heavy rainfall with alternate wet and dry periods.
3. Laterite soil rich in oxides of iron and aluminium compounds and Silica .
4. Laterite soils are red in colour due to little clay and more gravel of red sand-stones.

Which of the above statements are correct?

a) Only 1,2,3
b) Only 1,4
c) Only 2,4
d) Only 1,3,4

Q.29) Solution (b)

Explanation:

Laterite soils are mostly the end products of weathering.
They are formed under conditions of high temperature and heavy rainfall with alternate wet and dry periods.
Heavy rainfall promotes leaching (nutrients gets washed away by water) of soil whereby lime and silica are leached away and a soil rich in oxides of iron and aluminium compounds is left behind.
'Laterite' means brick in Latin. They harden greatly on loosing moisture. Laterite soils are red in colour due to little clay and more gravel of red sand-stones.

Q.30) Consider the following statements regarding the mountain soil:

1. These soils occupy about 15 percent of the total land area of India.
2. The north facing slopes of Himalaya are very steep and exposed to denudation and hence do not support soil formation.
3. They are suitable for plantations of tea, coffee, spices and tropical fruits in peninsular forest region.
4. Wheat, maize, barley and temperate fruits are grown in the Himalayan forest region.

Which of the above statements are correct?

a) Only 1,2
b) Only 3,4
c) Only 1,3
d) Only 1,3,4

Q.30) Solution (b)

Explanation:

Mountain soils occupy 8.67% of the total land area of India. They are mainly heterogeneous soils found on the hill slopes covered by forests. The formation of these soils is mainly governed by the characteristic deposition of organic matter derived from forests and their character changes with parent rocks, ground-configuration and climate.

In the Himalayan region, such soils are mainly found in valleys, less steep and north facing slopes. The south facing slopes are very steep and exposed to denudation and hence do not support soil formation. Forest soils occur in Western and Eastern Ghats also.
The forest soils are very rich in humus. They are deficient in potash, phosphorus and lime. They require good deal of fertilizers for high yields. They are suitable for plantations of tea, coffee, spices and tropical fruits in peninsular forest region. Wheat, maize, barley and temperate fruits are grown in the Himalayan forest region.

Q.31) Consider the following statements regarding the Peaty – Marshy Soils:

1. These are soils with large amount of organic matter and considerable amount of soluble salts.
2. It is called kari in Kottayam and Alappuzha districts of Kerala.
3. They are black, heavy and highly acidic.
4. They are deficient in potash and phosphate.

Which of the above statements are correct?

a) Only 1,2,3
b) Only 1,3,4
c) Only 2,3,4
d) All of the above

Q.31) Solution (d)

Explanation:

About the Peaty – Marshy Soils:

These are soils with large amount of organic matter and considerable amount of soluble salts. The most humid regions have this type of soil. They are black, heavy and highly acidic.

Distribution of Peaty – Marshy Soils:
Kottayam and Alappuzha districts of Kerala where it is called kari. Also occur in the coastal areas of Odisha and Tamil Nadu, Sunderbans of West Bengal, in Bihar and Almora district of Uttarakhand.

Chemical Properties of Peaty – Marshy Soil:

They are deficient in potash and phosphate.
Crops of Peaty – Marshy Soils: Most of the peaty soils are under water during the rainy season but as soon the rains cease, they are put under paddy cultivation.

Q.32) Consider the following statements regarding the Characteristics of Indian Soils:

1. Indian soils are largely deficient in nitrogen, mineral salts, but they are rich in humus and other organic materials.
2. Indian soils have been used for cultivation for hundreds of years and have lost much of their fertility.

Which of the above statements are correct?

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

Q.32) Solution (b)

Explanation:

Characteristics of Indian Soils:

Most soils are old and mature. Soils of the peninsular plateau are much older than the soils of the great northern plain.
Indian soils are largely deficient in nitrogen, mineral salts, humus and other organic materials. Plains and valleys have thick layers of soils while hilly and plateau areas depict thin soil cover. Some soils like alluvial and black soils are fertile while some other soils such as laterite, desert and alkaline soils lack in fertility and do not yield good harvest. Indian soils have been used for cultivation for hundreds of years and have lost much of their fertility.

Q.33) Consider the following statements:

1. Soil erosion in (punjab haryana region),Chambal Ravines etc
2. Deficiency in fertility (Red, lateritic and other soils)
3. Desertification (around Thar desert, rain-shadow regions like parts of Karnataka, Telangana etc.)

4. Waterlogging (chambal ravines region) salinity and alkalinity (excessively irrigated regions of Punjab, Haryana, Karnataka etc.)
5. Wasteland, over exploitation of soils due to increase in population and rise in living standards and encroachment of agricultural land due to urban and transport development.

Which of the above statements are problems with Indian soils?

a) Only 1,2,3,4
b) Only 2,3,5
c) Only 1,3,5
d) All of the above

Q.33) Solution (b)

Explanation:

Problems of Indian Soils include:

1. Soil erosion (Himalayan region, Chambal Ravines etc.)
2. Deficiency in fertility (Red, lateritic and other soils)
3. Desertification (around Thar desert, rain-shadow regions like parts of Karnataka, Telangana etc.)
4. Waterlogging (Punjab-Haryana plain)
5. Salinity and alkalinity (excessively irrigated regions of Punjab, Haryana, Karnataka etc.) 6. Wasteland, over exploitation of soils due to increase in population and rise in living standards and encroachment of agricultural land due to urban and transport development.

Q.34) Consider the following statements regarding the Alluvial Soils:

1. The proportion of nitrogen is generally low with proportion of Potash, phosphoric acid and alkalies being adequate.
2. They are the largest soil group covering about 76 per cent of the total area.
3. They support more than 40% of the India's population by providing the most productive agricultural lands.
4. The soil is porous because of its loamy (equal proportion of sand and clay) nature.

Which of the above statements are correct?

a) Only 1,2,3
b) Only 1,3,4

c) Only 2,3,4
d) All of the above

Q.34) Solution (b)

Explanation:

Alluvial soils are the largest soil group covering about 46 per cent of the total area. They support more than 40% of the India's population by providing the most productive agricultural lands.

Characteristics of 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. Pebbly and gravelly soils are rare. Kankar (calcareous concretions) beds are present in some regions along the river terraces. 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. These soils are constantly replenished by the recurrent floods.

Chemical properties of Alluvial Soils:

The proportion of nitrogen is generally low. The proportion of Potash, phosphoric acid and alkalies are adequate The proportion of Iron oxide and lime vary within a wide range.

Distribution of Alluvial Soils in India:

They occur all along the Indo-Gangetic-Brahmaputra plains except in few places where the top layer is covered by desert sand. They also occur in deltas of the Mahanadi, the Godavari, the Krishna and the Cauvery, where they are called deltaic alluvium (coastal alluvium) Some alluvial soils are found in the Narmada, Tapi valleys and Northern parts of Gujarat. Crops in Alluvial Soils They are mostly flat and regular soils and are best suited for agriculture. They are best suited to irrigation and respond well to canal and well/tube-well irrigation. They yield splendid crops of rice, wheat, sugarcane, tobacco, cotton, jute, maize, oilseeds, vegetables and fruits.

Geological divisions of alluvial soils:

Geologically, the alluvium of the Great plain of India is divided into newer or younger khadar and older bhangar soils.

Bhabar

The bhabar belt is about 8-16 km wide running along the Shiwalik foothills. It is a porous, northern most stretch of Indo-Gangetic plain. Rivers descending from the Himalayas deposit their load along the foothills in the form of alluvial fans. These alluvial fans (often pebbly soils) have merged together to build up the bhabar belt. The porosity of bhabar is the most unique feature. The porosity is due to deposition of huge number of pebbles and rock debris across the alluvial fans. The streams disappear once they reach the bhabar region because of this porosity. Therefore, the area is marked by dry river courses except in the rainy season. The area is not suitable for agriculture and only big trees with large roots thrive in this belt.

Terai

Terai is an ill-drained, damp (marshy) and thickly forested narrow tract (15-30 km wide) to the south of Bhabar running parallel to it. The underground streams of the Bhabar belt re-emerge in this belt. It is a swampy lowland with silty soils. The terai soils are rich in nitrogen and organic matter but are deficient in phosphate. These soils are generally covered by tall grasses and forests but are suitable for a number of crops such as wheat, rice, sugarcane, jute etc.. This thickly forested region provides shelter to a variety of wild life.

Bhangar

The Bhangar is the older alluvium along the river beds forming terraces higher than the flood plain (about 30 metres above the flood level).
It is of a more clayey composition and is generally dark colored.
A few metres below the terrace of the bhangar are beds of lime nodules known as "Kankar".

Khadar

The Khadar is composed of newer alluvium and forms the flood plains along the river banks. The banks are flooded almost every year and a new layer of alluvium is deposited with every flood. This makes them the most fertile soils of Ganges.

They are sandy clays and loams, more dry and leached, less calcareous and carbonaceous (less kankary). A new layer of alluvium is deposited by river flood almost every year.

Q.35) Consider the following statements regarding the Black soil:

1. It is a soil group typical to the dry and hot regions of the Peninsula.
2. In general, black soils of uplands are of low fertility while those in the valleys are very fertile.
3. The black colour is due to the presence of a small proportion of titaniferous magnetite or iron and black constituents of the parent rock.
4. This soil is ideal for Rice and sugarcane irrespective of water availability.

Which of the above statements are correct?

a) Only 1,2,3
b) Only 2,3,4
c) Only 1,3,4
d) All of the above

Q.35) Solution (a)

Explanation:

These soils are best suited for cotton crop. Hence these soils are called as regur and black cotton soils. Other major crops grown on the black soils include wheat, jowar, linseed, virginia tobacco, castor, sunflower and millets. Rice and sugarcane are equally important where irrigation facilities are available. Large varieties of vegetables and fruits are also successfully grown on the black soils. This soil has been used for growing a variety of crops for centuries without adding fertilizers and manures, with little or no evidence of exhaustion.

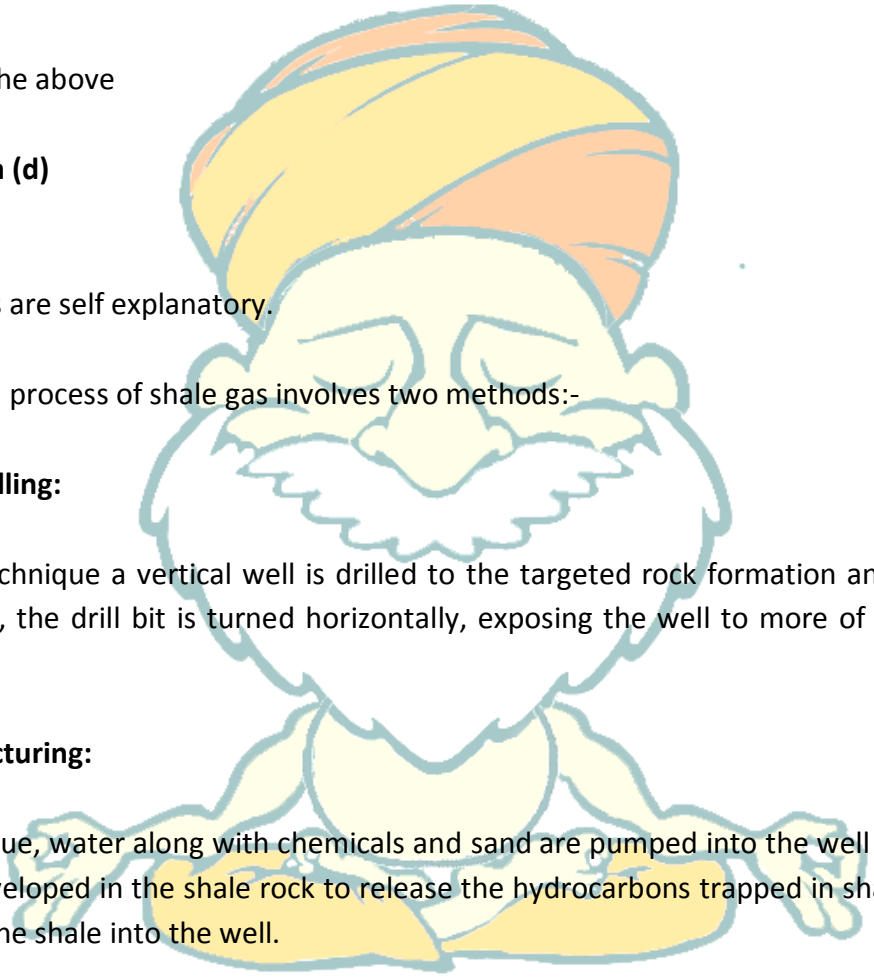
Q.36) Consider the following statements regarding the Shale Gas:

1. Shale refers to a sedimentary rock resulted from compaction process of small old rocks containing mud and minerals – such as quartz and calcite, trapped beneath the earth surface.

2. The shale gas is the natural gas trapped within these shale rocks. It is one of the unconventional types of natural gas along with coal bed methane, tight sandstones, and methane hydrates.
3. The extraction process of shale gas involves two methods:- Horizontal drilling and Hydraulic Fracturing

Which of the above statements are correct?

a) Only 1
b) Only 2
c) Only 3
d) All of the above



Q.36) Solution (d)
Explanation:

All statements are self explanatory.

The extraction process of shale gas involves two methods:-

Horizontal drilling:

Under this technique a vertical well is drilled to the targeted rock formation and then at the desired depth, the drill bit is turned horizontally, exposing the well to more of the producing shale.

Hydraulic Fracturing:

In this technique, water along with chemicals and sand are pumped into the well and a fracture or crack is developed in the shale rock to release the hydrocarbons trapped in shale formations to flow from the shale into the well.

Hydraulic fracturing when used in conjunction with horizontal drilling, it enables gas producers to extract shale gas at reasonable cost and rapidly as it enhances the flow of gas quickly to the desired well.

Jambusar located near Vadodara in Gujarat is India's first shale gas exploratory successfully drilled in Cambay region.

Q.37) Consider the following statements regarding the Shale Gas in India:

1. To strengthen its hydrocarbon resource base, India has identified six basins as areas for shale gas exploration: Cambay (Gujarat), Assam-Arakan (North East), Gondwana (Central India), Krishna Godavari onshore (East Coast), Cauvery onshore, and Indo-Gangetic basins.
2. Shale gas is an unconventional source of energy found in highly porous rocks with low permeability.
3. In addition to shale gas, India has got reserves of other unconventional natural gases like Coal Bed Methane, Coal Mine Methane, and Tight Gas which are in the different stages of development/production.

Which of the above statements are correct?

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

Q.37) Solution (c)
Explanation:

Shale gas is found in LOW POROSITY but HIGH PERMEABILITY rock formations.
Two separate characteristics of rocks control how effective they are as aquifers:
Porosity is a measure of how much of a rock is open space. This space can be between grains or within cracks or cavities of the rock. Permeability is a measure of the ease with which a fluid (water in this case) can move through a porous rock.
Please see the following links to understand the concept of porosity and permeability by the use of diagrams:
http://earthresources.vic.gov.au/__data/assets/image/0007/1563352/permeability-.jpg
https://encrypted-tbn0.gstatic.com/images?q=tbn:ANd9GcRKsr6xWeKbEsycy_ERfIZ0ONCqy0UCAmQLXck1S7J-LFJ3zeiw

The question has been framed from the following links:

https://www.thehindubusinessline.com/economy/india-to-hunt-for-shale-gas-in-6-basins/article23049469.ece

https://www.thehansindia.com/posts/index/Opinion/2018-12-02/Shale-gas-reserve-in-India-source-of-clean-energy/451020

Q.38) Consider the following statements:

1. In addition to shale gas, India has got reserves of other unconventional natural gases like Coal Bed Methane, Coal Mine Methane, and Tight Gas which are in the different stages of development/production.
2. The CBM is extracted from virgin coal mines. At present CBM is produced from four blocks - Jharia in Jharkhand, Raniganj East and South in West Bengal and Sohagpur West in Madhya Pradesh.
3. At present Coal Mine Methane is not trapped and is blown out of coal mines. Tight Gas reservoirs in Eocene formations in Gujarat and Northeast India have been discovered.
4. No commercial discovery of shale gas reserves has been made in India so far.

Which of the above statements are incorrect?

a) Only 1 and 2
b) Only 2 and 3
c) Only 3 and 4
d) None of them is incorrect.

Q.38) Solution (d)

Explanation:

All the statements are self explanatory.

Coal Bed Methane or CBM refers to methane that is found in coal seams. It is formed during the process of coalification, the transformation of plant material into coal. CBM is also known as virgin coal seam methane or coal seam gas. It is widely considered an "unconventional" source of natural gas.

Coal Mine Methane or CMM refers to methane released from the coal and surrounding rock strata due to mining activities. In underground mines, it can create an explosive hazard to coal miners, so it is removed through ventilation systems. In abandoned mines and surface mines, methane might also escape to the atmosphere through natural fissures or other diffuse sources.
Like CBM, CMM is a subset of the methane found in coal seams, but it refers specifically to the methane found within mining areas (e.g., within a mining plan), while CBM refers to methane in coal seams that will never be mined. Because CMM would be released through mining activities, recovering and using CMM is considered emissions avoidance.

Ventilation air methane (also known as VAM) refers to the very dilute methane that is released from underground mine ventilation shafts. VAM represents more than half of all coal mining emissions in the United States and worldwide. With few exceptions, it is simply released to the atmosphere.

The high volumetric flowrate and low concentrations of VAM (i.e., less than 1 percent) make it challenging to capture and utilize cost-effectively. It is technically possible, however, to convert the dilute methane in ventilation air to useful energy and the economic feasibility of these projects are currently being developed, demonstrated, and commercialized.

Tight gas refers to natural gas reservoirs locked in extraordinarily impermeable, hard rock, making the underground formation extremely "tight." Tight gas can also be trapped in sandstone or limestone formations that are atypically impermeable or nonporous, also known as tight sand.
In other words, the pores in the rock formation in which the gas is trapped are either irregularly distributed or badly connected with overly narrow capillaries, lessening permeability -- or the ability of the gas to travel through the rock.
KINDLY SEE THE BELOW LINK TO UNDERSTAND THE LOCATIONS OF VARIOUS GAS DEPOSITS:
https://www.aph.gov.au/~/media/05%20About%20Parliament/54%20Parliamentary%20Depts/544%20Parliamentary%20Library/BriefingBook44p/GasDebate.gif?la=en

THE QUESTION HAS BEEN FRAMED USING FOLLOWING LINKS:

https://www.bloombergquint.com/business/no-commercial-discovery-of-shale-gas-reserves-in-india-yet-says-pradhan

https://www.thehansindia.com/posts/index/Opinion/2018-12-02/Shale-gas-reserve-in-India-source-of-clean-energy/451020

https://www.epa.gov/cmop/frequent-questions#q2

https://www.rigzone.com/training/insight.asp?insight_id=346&c_id=

Q.39) Consider the following statements regarding Gas Hydrates:

1. When gas molecules are trapped in a lattice of water molecules at temperatures above 0°C and pressures above one atmosphere, they can form a stable solid. These solids are gas hydrates.
2. Most gas hydrates are formed from methane (CH4). Methane is the simplest hydrocarbon, and is the primary component of the natural gas that we burn for energy.
3. Gas hydrate deposits along ocean margins are estimated to exceed known petroleum reserves by about a factor of three.
4. These hydrate beds leak gases into the water, forming cold seeps on the ocean floor. This hydrocarbon seepage is common on continental margins around the world.
5. Most seeps are also characterized by high microbial productivity.

Which of the above statements are correct?

a) Only 1, 2 and 3
b) Only 2, 3 and 4
c) Only 3, 4 and 5
d) All of the above

Q.39) Solution (d)

Explanation:

All statements are self explanatory and have been taken from the following link:

https://oceanexplorer.noaa.gov/facts/hydrates.html

Q.40) Consider the following statements regarding the Gas Hydrates in India:

1. ONGC has been an active participant in the National Gas Hydrate Programes (NGHPs). To promote this a Gas Hydrate Research & Technology Centre (GHRTC) was established at Panvel. The gas hydrate programme by India began in 1997.
2. ONGC has struck gas hydrate reserves in the deep sea off the Andhra Pradesh coast. The reserves are located in the Krishna-Godavari basin, which came into the limelight about a decade ago.
3. The fresh reserves are estimated to be around 134 trillion cubic feet (tcf), about one-third of the gas reserves of the United States, which is the largest producer of natural gas in the world.
4. At present, there are technologies like depressurising, heating method and injection of carbon dioxide to replace the extracted gas

Which of the above statements are correct?

a) Only 1 and 2
b) Only 2 and 3
c) Only 3 and 4
d) All of the above

Q.40) Solution (d)

Explanation:

All statements are self explanatory and have been taken from following links:

https://www.ongcindia.com/wps/wcm/connect/en/about-ongc/new-initiatives-in-energy/gas-hydrates/

https://www.business-standard.com/article/economy-policy/india-might-hold-world-s-second-largest-gas-hydrate-reserves-118060501430_1.html