

Q.1) Consider the following statements with respect to Soil formation:

1. Weathering aids soil formation but is not an essential condition for it.
2. Soils which are very young show strong relation with parent rock material.
3. Parent materials of soils are always from in-situ rocks that get eroded.

Which of the above statements is/are correct?

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

Q.1) Solution: (b)

Explanation

- **Soil formation or pedogenesis depends first on weathering.** It is this weathering mantle (depth of the weathered material) which is the basic input for soil to form. Thus, weathering is the basis for soil formation and not just an aiding factor. So, **statement 1 is incorrect.**
- First, the weathered material or transported deposits are colonised by bacteria and other inferior plant bodies like mosses and lichens. Also, several minor organisms may take shelter within the mantle and deposits. The dead remains of organisms and plants help in humus accumulation. Minor grasses and ferns may grow; later, bushes and trees will start growing through seeds brought in by birds and wind. Plant roots penetrate down, burrowing animals bring up particles, mass of material becomes porous and sponge-like with a capacity to retain water and to permit the passage of air and finally a mature soil, a complex mixture of mineral and organic products forms.
- Parent Material: Parent material is a passive control factor in soil formation. **Parent materials can be any in-situ** or on-site weathered rock debris (residual soils) **or transported deposits** (transported soils). Thus, **statement 3 is incorrect.**
- Soil formation depends upon the texture (sizes of debris) and structure (disposition of individual grains/particles of debris) as well as the mineral and chemical composition of the rock debris/deposits. Nature and rate of weathering and depth of weathering mantle are important considerations under parent materials. There may be differences in soil over similar bedrock and dissimilar bedrocks may have similar soils above them. But when **soils are very young and have not matured these show strong links with the type of parent rock.** Also, in case of some limestone areas, where the weathering processes are specific and peculiar, soils will show clear relation with the parent rock. So, **statement 2 is correct.**

Q.2) Which of the following are passive factors in soil formation?

1. Time
2. Climate
3. Parent rock
4. Biological organisms

Select the correct answer from the codes given below:

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

Q. 2) Solution: (c)

Explanation

- Soils are often defined in terms of factors as “dynamic natural bodies having properties derived from the combined effect of climate and biotic activities (organisms), as modified by topography, acting on parent materials over periods of time”.
- Soil scientists identify **climate and biological activity** as “**active**” factors of soil formation because their influence over soil development can be **directly observed**. For example, rain, heat, cold, wind, microorganisms (algae, fungi), earthworms, and burrowing animals can be directly observed influencing soil development.
- **Time, topography, and parent material** are noted as “**passive**” factors because their effects are not immediately observed. The passive factors can, however, control how climate and organisms affect soil development and formation.

Q.3) Consider the following statements:

1. Over gentle slopes, soil erosion is easier which makes soil formation very difficult.
2. Soils in the tropical areas have deeper profiles than the tundra region soils.
3. Soils in the equatorial climate have very low humus content.

How many of the above statements is/are correct?

- a) Only 1 statement is correct.
- b) Only 2 statements are correct.
- c) All 3 statements are correct.
- d) None of the statements are correct.

Q. 3) Solution: (b)

Explanation

Soil-forming Factors

- Five basic factors control the formation of soils:
 - parent material; (ii) topography; (iii) climate; (iv) biological activity; (v) time.
- In fact, soil forming factors act in union and affect the action of one another.
- Parent Material
 - Parent material is a passive control factor in soil formation. Parent materials can be any in-situ or on-site weathered rock debris (residual soils) or transported deposits (transported soils). Soil formation depends upon the texture (sizes of debris) and structure (disposition of individual grains/particles of debris) as well as the mineral and chemical composition of the rock debris/deposits.
 - Nature and rate of weathering and depth of weathering mantle are important considerations under parent materials. There may be differences in soil over similar bedrock and dissimilar bedrocks may have similar soils above them. But when soils are very young and have not matured these show strong links with the type of parent rock. Also, in case of some limestone areas, where the weathering processes are specific and peculiar, soils will show clear relation with the parent rock.
- Topography
 - Topography like parent materials is another passive control factor. The influence of topography is felt through the amount of exposure of a surface covered by parent materials to sunlight and the amount of surface and sub-surface drainage over and through the parent materials. Soils will be thin on steep slopes and thick over flat upland areas. **Over gentle slopes where erosion is slow and percolation of water is good, soil formation is very favourable.** Soils over flat areas may develop a thick layer of clay with good accumulation of organic matter giving the soil dark colour. So, **statement 1 is incorrect.**
- Climate
 - Climate is an important active factor in soil formation. The climatic elements involved in soil development are : (i) moisture in terms of its intensity, frequency and duration of precipitation - evaporation and humidity; (ii) temperature in terms of seasonal and diurnal variations.
 - Precipitation gives soil its moisture content which makes the chemical and biological activities possible. Excess of water helps in the downward transportation of soil components through the soil (eluviation) and deposits the same down below (illuviation). In climates like wet equatorial rainy areas with high rainfall, not only calcium, sodium, magnesium, potassium etc. but also a

major part of silica is removed from the soil. Removal of silica from the soil is known as desilication. In dry climates, because of high temperature, evaporation exceeds precipitation and hence ground water is brought up to the surface by capillary action and in the process the water evaporates leaving behind salts in the soil. Such salts form into a crust in the soil known as hardpans. In tropical climates and in areas with intermediate precipitation conditions, calcium carbonate nodules (kanker) are formed.

- Temperature acts in two ways — increasing or reducing chemical and biological activity. Chemical activity is increased in higher temperatures, reduced in cooler temperatures (with an exception of carbonation) and stops in freezing conditions. That is why, **tropical soils with higher temperatures show deeper profiles and in the frozen tundra regions soils contain largely mechanically broken materials. Hence, statement 2 is correct.**
- Biological Activity
 - The vegetative cover and organisms that occupy the parent materials from the beginning and also at later stages help in adding organic matter, moisture retention, nitrogen etc. Dead plants provide humus, the finely divided organic matter of the soil. Some organic acids which form during humification aid in decomposing the minerals of the soil parent materials.
 - Intensity of bacterial activity shows up differences between soils of cold and warm climates. Humus accumulates in cold climates as bacterial growth is slow. With undecomposed organic matter because of low bacterial activity, layers of peat develop in subarctic and tundra climates. **In humid tropical and equatorial climates, bacterial growth and action is intense and dead vegetation is rapidly oxidised leaving very low humus content in the soil. Thus, statement 3 is correct.**
 - Further, bacteria and other soil organisms take gaseous nitrogen from the air and convert it into a chemical form that can be used by plants. This process is known as nitrogen fixation. Rhizobium, a type of bacteria, lives in the root nodules of leguminous plants and fixes nitrogen beneficial to the host plant. The influence of large animals like ants, termites, earthworms, rodents etc., is mechanical, but, it is nevertheless important in soil formation as they rework the soil up and down. In case of earthworms, as they feed on soil, the texture and chemistry of the soil that comes out of their body changes.
- Time
 - Time is the third important controlling factor in soil formation. The length of time the soil forming processes operate, determines maturation of soils and profile development. A soil becomes mature when all soil-forming processes act for a sufficiently long time developing a profile. Soils developing from recently deposited alluvium or glacial till are considered young and they exhibit no

horizons or only poorly developed horizons. No specific length of time in absolute terms can be fixed for soils to develop and mature.

Q. 4) With reference to the physical and chemical characteristics of the soil, which of the following statement is not correct?

- Soil contains matter in all three states: solid, liquid and gaseous.
- In a loam soil, clay, silt and sand are found in equal proportions.
- Capillary water is readily available for plants to for absorption
- Texture of soil can be easily changed while the structure of soil is relatively difficult to change.

Q.4) Solution: (d)

Explanation:

- **Soil contains matter in all three states: solid, liquid and gaseous.** The solid portion is partly organic and partly inorganic. The inorganic, or mineral, part of the soil is made up of particles derived from the parent material, the rocks which weather to form the soil. The organic portion consists of living and decayed plant and animal materials such as roots and worms. The end-product of decay is humus, black amorphous organic matter.
- Soil texture and soil structure are both unique properties of the soil that will have a profound effect on the behaviour of soils, such as water holding capacity, nutrient retention and supply, drainage, and nutrient leaching.
- Soil Texture indicates the relative content of particles of various sizes, such as sand, silt and clay in the soil. Texture influences the ease with which soil can be worked, the amount of water and air it holds, and the rate at which water can enter and move through soil.
 - Loam is a soil in which no one grade dominates, or in which all the grades are present in equal proportions. Thus, **loam has clay, silt and sand in equal proportions.**
- Soil structure is the arrangement of soil particles into groupings called peds or aggregates, which often form distinctive shapes typically found within certain soil horizons. For example, granular soil particles are characteristic of the surface horizon.
 - Soil aggregation is an important indicator of the workability of the soil. Soils that are well aggregated are said to have “good soil tilth.”
- Soil texture is a soils natural property and thus is not changed easily while the structure i.e., the way the particles aggregate, can be altered by soil management. **Thus, statement d is incorrect.**

- Soil water: There are different types of water available in the soil, only few of which is available for the plants to absorb.
 - **Gravitational water:** The water which percolates deep in the soil, due to gravity is called 'gravitational water'. This water goes beyond the reach of roots of most of the plants, thus is **not available to plants for absorption**.
 - **Hygroscopic water:** Fine soil particles imbibe/absorb water and hold it very tightly. This is called 'hygroscopic water. **Roots cannot absorb it.**
 - **Combined water:** Water present in the form of hydrated oxides of silicon, aluminium, etc., is called 'combined water'. It is also **not available to plants** for absorption.
 - **Capillary water:** Some amount of water is held in pores present between the neighbouring soil particles, due to capillarity. This is called capillary water which is **readily available for absorption**.

Q.5) Which of the following statements about Chernozem or 'black soil' is correct?

1. It is extremely fertile due to huge humus content.
2. It needs long summers to develop well.
3. It is present in the middle latitudes of both hemispheres.

Select the correct answer from the codes given below:

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

Q.5) Solution: (c)

Explanation:

- Chernozems (from the Russian words for “black earth”) are **humus-rich** grassland soils used extensively for growing cereals or for raising livestock. **Statement 1 is correct.**
- Chernozems are characterized by a surface layer that is rich in humus resulting in a well-aggregated structure with abundant natural grass vegetation.
- They are **found in the middle latitudes of both hemispheres**, in zones commonly termed prairie in North America, pampa in Argentina, and steppe in Asia or in eastern Europe. Chernozems account for 1.8 percent of the total continental land area on Earth. **Statement 3 is correct.**

- They form in climatic zones with **cold winters; and with relatively short, hot summers**. The region would have seasonal rainfall of 450–600 mm per year during early summer. **Statement 2 is incorrect.**
- In the colder areas of these climatic zones, a natural tall-grass vegetation develops on soil profiles whose surface layers can be as much as two metres (about six feet) thick, with up to 16% humus by mass. Lime may accumulate below this layer because of limited downward percolation of calcium salts.

Q. 6) With reference to the quality of soil, consider the following statements:

1. Over-irrigation leads to reduced soil salinity as salts get washed away.
2. Saline soils are mostly made up of soluble salts while alkaline soils have insoluble salts.

Which of the statements given above is/are correct?

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

Q.6) Solution: (d)

Explanation

- Soils affected by soluble salts, principally sodium, magnesium, sulfate, chloride, and calcium, and subsequently potassium, nitrate, carbonate, bicarbonate, and boron, are referred to as saline and alkaline soil. They are sometimes referred to as **Usara soils**.
- They contain a larger proportion of sodium, potassium and magnesium, and thus, they are infertile, and do not support any vegetative growth.
- **Soil salinity and soil alkalinity are the results of over-irrigation**. They occur in arid and semi-arid regions, and in waterlogged and swampy areas. So, over-irrigation is a cause of soil salinity. Thus, **statement 1 is incorrect**.
- Both salinity and alkalinity involve soluble salts. Thus, **statement 2 is incorrect**. While **salinity** means the predominance of **chlorides and sulphates of sodium, calcium, and magnesium** in the soils in sufficient quantity to be able to seriously interfere with the growth of most plants, **alkalinity** means the dominance of **sodium salts, especially sodium carbonate**.
- In saline soils, the salt concentration is more with the exchangeable sodium percentage being less than 15. It has a pH value below 8.5. Whereas, alkaline soils have low soluble

salts with an exchangeable ion percentage of more than 15. Its pH value is more than 8.5.

Q. 7) With reference to Red Soil in India, consider the following statements:

1. It develops in areas with low rainfall in the Deccan plateau.
2. In hydrated form it looks reddish while in dry form it looks yellow

Which of the statements given above is/are correct?

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

Q.7) Solution: (a)

Explanation:

- **Red soil develops on crystalline igneous rocks in areas of low rainfall in the southern and eastern part of the Deccan Plateau.** A long stretch of area is occupied by red loamy soil, along the piedmont zone of Western Ghat. Yellow and red soils are also found in parts of Chhattisgarh and Odisha and in the southern parts of the middle Ganga plain. Thus, **statement 1 is correct**.
- **Due to a wide diffusion of iron in crystalline and metamorphic rocks, the soil develops a reddish colour. When it occurs in a hydrated form, it looks yellow.** The fine-grained red and yellow soils are normally fertile, whereas in dry upland areas the soil has poor fertility due to coarse-grained structure. They are generally poor in humus, phosphorus, and nitrogen. Thus, **statement 2 is incorrect**.

Q.8) Consider the following statements with respect to black soils in India:

1. They have high water retention capacity.
2. These soils are widespread in the northern plains and the river valleys.
3. They lack organic matter.

Which of the statements given above is/are correct?

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

Q.8) Solution: (a)

Explanation

- The black soils are generally clayey, deep and impermeable. They swell and become sticky when wet and shrink when dried. So, during the dry season, these soils develop wide cracks. Thus, there occurs a kind of 'self-ploughing'. Because of this character of slow absorption and loss of moisture, the **black soil retains the moisture for a very long time**, which helps the crops, especially, the rain-fed ones, to sustain even during the dry season. Thus, **statement 1 is correct**.
- Black soil covers most of the Deccan Plateau which includes parts of Maharashtra, Madhya Pradesh, Gujarat, Andhra Pradesh and some parts of Tamil Nadu. The Northern plains and river valleys have alluvial soils. Thus, **statement 2 is incorrect**.
- Chemically, the black soils are rich in lime, iron, magnesia and alumina. They also contain potash. But **they lack in phosphorous, nitrogen and organic matter**. The colour of the soil ranges from deep black to grey. Thus, **statement 3 is correct**.

Q.9) Consider the following statements regarding Alluvial soils:

1. These are rich in all major nutrients necessary plant growth, especially nitrogen, phosphorus and potash.
2. The sand content of the alluvial soils increases from west to east in the Gangetic system

Which of the statements given above is/are correct?

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

Q.9) Solution: (d)

Explanation

- Alluvial soils are widespread in the northern plains and the river valleys. These soils cover about 40 per cent of the total area of the country. They are depositional soils, transported and deposited by rivers and streams. Through a narrow corridor in Rajasthan, they extend into the plains of Gujarat. In the Peninsular region, they are found in deltas of the east coast and in the river valleys.
- The alluvial soils vary in nature from sandy loam to clay. **They are generally rich in potash but poor in phosphorous and nitrogen.** Thus, **statement 1 is incorrect.**
- In the Upper and Middle Ganga plain, two different types of alluvial soils have developed, viz. Khadar and Bhangar. Khadar is the new alluvium and is deposited by floods annually, which enriches the soil by depositing fine silts. Bhangar represents a system of older alluvium, deposited away from the flood plains. Both the Khadar and Bhangar soils contain calcareous concretions (Kankars). These soils are more loamy and clayey in the lower and middle Ganga plain and the Brahmaputra valley. The **sand content decreases from the west to east. Statement 2 is incorrect.**
- The colour of the alluvial soils varies from the light grey to ash grey. Its shades depend on the depth of the deposition, the texture of the materials, and the time taken for attaining maturity. Alluvial soils are intensively cultivated.

Q.10) Which of the following statement about alluvial soil in India is *incorrect*?

- Both Khadar and Bhangar contain calcareous rocks (Kankars).
- Alluvial soils are immature soils and have weak profiles.
- Bhangar represents new alluvium, while Khadar is older alluvium.
- They are poor in phosphorus and humus.

Q.10) Solution: (c)

Explanation

- Alluvial soils are widespread in the northern plains and the river valleys. These soils cover about 40 per cent of the total area of the country. They are depositional soils, transported and deposited by rivers and streams. Thus, **they are young immature soils with poor profile.**
- The alluvial soils vary in nature from sandy loam to clay.
- They are generally rich in potash but **poor in phosphorous and humus.** In the Upper and Middle Ganga plain, two different types of alluvial soils have developed, viz. Khadar and Bhangar.

- **Khadar is the new alluvium and is deposited by floods annually, which enriches the soil by depositing fine silts.**
- **Bhangar represents a system of older alluvium, deposited away from the flood plains.**
- **Both the Khadar and Bhangar soils contain calcareous concretions (Kankars).**
- These soils are more loamy and clayey in the lower and middle Ganga plain and the Brahmaputra valley. The sand content decreases from the west to east i.e., they become clayey loam towards the delta.
- Through a narrow corridor in Rajasthan, they extend into the plains of Gujarat. In the Peninsular region, they are found in deltas of the east coast and in the river valleys. Alluvial soils are intensively cultivated.

Q.11) Arrange the following belts of alluvial plains from north to south:

1. Bhabar
2. Terai
3. Bhangar
4. Khadar

Select the correct answer using the code given below.

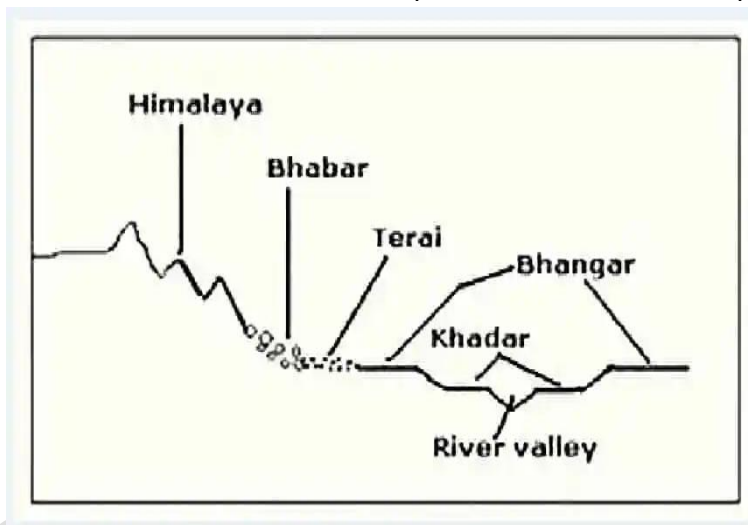
- a) 1-2-3-4
- b) 3-2-4-1
- c) 3-2-1-4
- d) 1-3-4-2

Q.11) Solution: (a)

Explanation

- The Great Plains exhibit a remarkably homogeneous surface with little relief. It is a featureless alluvial fertile plain formed by the rivers' deposits.
- The plain may be divided into the following belts:
 - **Bhabar:** Bhabar belt is about a 7–15 km wide narrow belt adjacent to the foothills of the Himalayas. It is made up of porous, rocky soils and pebbles that get deposited at the foot of the Himalayas due to the breakoff slope. This material is made of debris washed down from higher ranges. Due to the very high porosity of this belt, water seeps down and the streams are lost and start flowing underground.

- **Terai:** The Terai belt is a 15-30 km wide marshy tract that lies next to Bhabar running parallel to it. Due to bedrock, the streams lost in Bhabar reappear in Terai. Thus, the water table is very high making the land marshy. Consequently, Terai is moist and thickly forested and is home to a variety of wildlife.
- **Bhangar:** Bhangar belt is the largest part of the Northern Plains made up of old alluvium and forms an alluvial terrace above flood plains. The soil is made up of old alluvium and in the drier parts, it has calcareous deposits called kankar.
- **Khadar:** Khadar belt is found along all rivers in the flood plains. Soil is made up of new alluvium which gets deposited every year due to floods. The deltaic plain has a huge amount of new alluvium and is mostly in the form of Khadar. It is an area of deposition as the river flows in this tract sluggishly.



Q.12) With regards to peatlands, consider the following statements:

1. Peatlands are a type of wetlands.
2. It constitutes of large amount of dead plant materials that decays rapidly.
3. They store twice as much carbon as all the world's forests.
4. They occupy more than 10% of the global land surface.

How many of the above statements is/are correct?

- a) Only 1 statement is correct.
- b) Only 2 statements are correct.
- c) Only 3 statements are correct.
- d) All 4 statements are correct.

Q.12) Solution: (b)

Explanation

- **Peatlands are a class of wetlands** i.e., ecosystems flooded with water.
- Waterlogged conditions limit microbial decay of dead plant materials. Hence, **statement 2 is incorrect.**
- These plant materials are rich in carbon dioxide and their slow decay prevents the reintroduction of the carbon dioxide gas into the atmosphere. In this way, **they store twice as much carbon as all the world's forests.**
- Some peatlands are buried under frozen ground or permafrost and exist as permafrost peatlands. They are found in the northern parts of Alaska, Canada, Russia and parts of northern Europe.
- **Peatlands occupy only 3% of the global land surface.** Thus, **statement 4 is incorrect.**

Q. 13) Consider the following statements with reference to peaty soils:

1. Peaty soils are formed in low humidity condition where the organic material do not get decomposed quickly.
2. Organic matter in peaty soils can go up to 50%.
3. These soils are generally acidic.

Which of the statements given above is/are correct?

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

Q.13) Solution: (c)

Explanation

- Peaty soils originate in **humid regions with high rainfall** as a result of the accumulation of large amounts of organic matter in the soil. So, **statement 1 is incorrect.**
- A large quantity of dead organic matter accumulates in these areas, and this gives rich humus and organic content to the soil. Organic matter in these soils may go even up to 40-50%. So, **statement 2 is correct.**
- The peaty soils are black, heavy and **highly acidic.** So, **statement 3 is correct.**
- Soils belonging to this group are found in the Kottayam and Alappuzha districts of Kerala where it is called Kari. Most of the peat soils are underwater during the rainy season but as soon the rains cease, they are put under paddy cultivation.

- Peaty soils are also found in the northern part of Bihar, the southern part of Uttaranchal and the coastal areas of West Bengal, Orissa and Tamil Nadu.

Q14) These soils develop in areas with high temperatures and high rainfall. They are poor in organic matter but rich in iron oxide and aluminium compounds due to leaching. They are reddish to yellow in colour. The above description suits which of the soils given below?

- Laterite Soil
- Red and Yellow Soil
- Forest Soil
- Saline Soil

Q. 14) Solution: (a)

Explanation

- Laterite has been derived from the Latin word 'Later' which means brick.
- The laterite soils develop in areas with **high temperatures and high rainfall**. These are the result of intense leaching due to tropical rains. With rain, lime and silica are leached away, and soils **rich in iron oxide and aluminum compounds** are left behind.
- **Laterite soil is reddish to yellow in colour.**
- Humus content of the soil is removed fast by bacteria that thrives well in high temperature. These soils are poor in organic matter, nitrogen, phosphate and calcium, while iron oxide and potash are in excess. Hence, laterites are not suitable for cultivation.
- Red laterite soils in Tamil Nadu, Andhra Pradesh and Kerala are more suitable for tree crops like cashewnut.
- Laterite soils are widely cut as bricks for use in house construction.
- These soils have mainly developed in the higher areas of the Peninsular plateau. The laterite soils are commonly found in Karnataka, Kerala, Tamil Nadu, Madhya Pradesh and the hilly areas of Odisha and Assam.

Q.15) These soils range from red to brown in colour. They are saline in nature. It lacks humus. Lower horizons of this soil type are occupied by calcareous rocks.

This description is most apt to which of the following soil type?

- Saline or Alkaline soil

- b) Red and Yellow soil
- c) Laterite soil
- d) Arid Soils

Q.15) Solution: (d)

Explanation

- **Arid soils range from red to brown in colour.**
- They are generally sandy in structure and **saline in nature**. In some areas, the salt content is so high that common salt is obtained by evaporating the saline water.
- Due to the dry climate, high temperature and accelerated evaporation, **they lack moisture and humus**. Nitrogen is insufficient and the phosphate content is normal.
- **Lower horizons of the soil are occupied by 'kankar' layers** because of the increasing calcium content downwards. The 'Kankar' layer formation in the bottom horizons restricts the infiltration of water, and as such when irrigation is made available, the soil moisture is readily available for a sustainable plant growth.
- Arid soils are characteristically developed in western Rajasthan, which exhibit characteristic arid topography. These soils are poor and contain little humus and organic matter.

Q. 16) Arrange the following soils in ascending order in the proportion which they are found in India

1. Inceptisols
2. Mollisols
3. Aridisols
4. Ultisols

Select the correct order:

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

Q.16) Solution: (b)

Explanation

Mollisols < Ultisols < Aridisols < Inceptisols

ICAR has classified the soils of India into the following order as per the USDA soil taxonomy

<i>Sl No.</i>	<i>Order</i>	<i>Area (in Thousand Hectares)</i>	<i>Percentage</i>
(i)	Inceptisols	130372.90	39.74
(ii)	Entisols	92131.71	28.08
(iii)	Alfisols	44448.68	13.55
(iv)	Vertisols	27960.00	8.52
(v)	Aridisols	14069.00	4.28
(vi)	Ultisols	8250.00	2.51
(vi)	Mollisols	1320.00	0.40
(viii)	Others	9503.10	2.92
Total			100

Source : Soils of India, National Bureau of Soil Survey and Land Use Planning, Publication Number 94

Q.17) Which of the following statement is correct regarding forest soils?

- These soils are homogeneous in nature.
- These soils are rich in potash and phosphorous due to large organic deposition.
- They do not support any type of cultivation.
- They are rich in silt and humus in the valley region.

Q.17) Solution: (d)

Explanation

- As the name suggests, forest soils are formed in forest areas where sufficient rainfall is available. The soils vary in structure and texture depending on the mountain environment where they are formed.

- The formation of these soils is governed by the characteristic deposition of organic matter derived from forest growth. These soils are **highly heterogeneous** in nature and their character changes with parent rock, ground configurations, and climate. Consequently, they differ greatly even if they occur in close proximity to one another. Thus, **statement a is incorrect**.
- They are **loamy and silty on valley sides** and coarse-grained on the upper slopes. In the snow-bound areas of the Himalayas, they experience denudation and are acidic with low humus content.
- **In lower valleys, forest soils are very rich in silt and humus** but are **deficient in potash, phosphorous**, and lime. Therefore, they require a good deal of fertilizers for high yields. Thus, **statement d is correct while statement b is incorrect**.
- They are especially **suitable for plantations** of tea, coffee, spices, and tropical fruits in Karnataka, Tamil Nadu, and Kerala and Wheat, Maize, Barley, and temperate fruits in Jammu and Kashmir, Himachal Pradesh, and Ladakh. So, **statement c is incorrect**.

Q.18) In the context of soil erosion, consider the following:

This type of soil erosion is common on steep slopes with large flow of water. It can lead to the formation of ravines. Contour farming can be a method to prevent this kind of erosion.

The above description aptly suits which of the following types of soil erosions?

- Bank erosion
- Gully erosion
- Sheet erosion
- Tunnel erosion

Q.18) Solution: (b)

Explanation

- **Bank erosion:** The erosion of soil from the banks (shores) of streams or rivers due to the flowing water is called bank erosion. In certain areas where the river changes its course, the river banks get eroded at a rapid rate. In this case erosion takes place laterally.
- **Rill erosion** occurs when **runoff water** forms small channels as it concentrates down a slope. After it takes place **finger-like rills** appear on the cultivated land. Several rill erosions can lead to the formation of gullies.

- **Gully erosion** occurs when **water is channelled across unprotected land and washes away the soil** along the drainage lines. Gully erosion is **common on steep slopes**. Gullies deepen with rainfall, cut the agricultural lands into small fragments, and make them unfit for cultivation. A region with a large number of deep gullies or ravines is called a **badland topography**. Under natural conditions, runoff is moderated by vegetation, which generally holds the soil together, protecting it from excessive runoff and direct rainfall. **Contour cultivation** which makes it possible to **slow down runoff and spread the water** over a wide area can be an effective method to prevent this type of erosion. Thus, **option b is correct**.
- **Sheet erosion** involves the uniform removal of soil in thin layers by the forces of **raindrops and overland flow**. The erosion can cover large areas of sloping land and go unnoticed for quite some time. This is also a **very slow process**. It takes place on **level lands after a heavy shower** and the soil removal is not easily noticeable. But it is harmful since it removes the finer and more fertile topsoil.
- **Tunnel erosion** is the removal of subsoil. When water penetrates through a soil crack or a hole where a root has decayed, the soil disperses and is carried away with the flow to leave a small tunnel. Tunnel erosion disrupts soil continuity, increases soil drainage, reduces water holding capacity and considerably reduces productivity.

Q.19) With reference to the tropical moist deciduous forests, consider the following statements:

1. These are present in regions receiving more than 200cm rainfall.
2. These forests can be found in the Andaman Islands, the Western Ghats, and the foothills of the Himalayas in the northeastern region.
3. They have dense undergrowth.

How many of the statements given above is/are not correct?

- a) Only 1 statement is correct.
- b) Only 2 statements are correct.
- c) Only 3 statements are correct.
- d) None of the statements are correct.

Q.19) Solution: (b)

Explanation

- Tropical deciduous forests are the most common type of forest in India. They are also known as monsoon forests and are found throughout the region, receiving rainfall

ranging from 200 cm to 70 cm. In the dry summer, trees of this forest type shed their leaves for about six to eight weeks. These forests are further classified as moist and dry deciduous based on the availability of water.

- The Moist deciduous forests are more pronounced in the regions that record rainfall between 100-200 cm. Although tropical deciduous forests are most widespread, dry deciduous forests are more prevalent in India than moist deciduous forests. Hence, **statement 1 is incorrect.**
- Characteristics of moist deciduous trees:
 - The trees drop their leaves during the spring and early summer when sufficient moisture is not available.
 - Heavily buttressed trees and fairly complete undergrowth.
 - During dry periods, trees shed their leaves to conserve water. Bare trees open up the canopy layer, allowing sunlight to reach the ground and promoting the growth of **dense undergrowth**. Hence, **statement 3 is correct.**
- These types of forests occur throughout the Andaman Islands, all along the eastern slopes of the Western Ghats, scattered freely through the low-lying hilly tracts and plains of Madhya Pradesh, Uttar Pradesh, Bihar, West Bengal, Odisha, and northeastern states along the foothills of Himalayas. Thus, **statement 2 is correct.**
- Teak, sal, shisham, hurra, mahua, amla, semul, kusum, and sandalwood etc. are the main species of these forests.

Q.20) Arrange the following forests in the ascending order based on their share of total area in percentage:

1. Tropical forest
2. Subtropical forest
3. Montane forest
4. Mangrove forest

Select the correct answer using the codes given below:

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

Q.20) Solution: (d)

Explanation

- Forests in India cover 24.62 per cent of the geographical area of the country. According to Forest Survey Report 2021, the percentage of different types of forest in India are as follows:
 - Tropical forest: 54.54%
 - Sub-tropical forest: 14.07%
 - Montane forest: 8.86%
 - Mangrove forest: 0.14%
 - Other forest types: 22.39%

Q.21) Consider the following statements with respect to 'Wassenaar Arrangement'

1. It is a voluntary export control regime which monitors exchange information on transfers of conventional weapons and dual-use goods and technologies
2. Admission of new members into the grouping requires the consensus of majority of the members
3. The Arrangement does not impede civil transactions and is not directed against any state or group of states

Choose the correct answer using the code given below

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

Q.21) Solution (c)

Explanation:

- The **Wassenaar Arrangement** is a voluntary export control regime. The Arrangement, formally established in July 1996, has 42 members who exchange **information on transfers of conventional weapons and dual-use goods and technologies**. Hence **statement 1 is correct**.
- The Arrangement is open on a global and nondiscriminatory basis to prospective adherents that comply with the agreed criteria. **Admission of new members requires the consensus of all members**. Hence **statement 2 is not correct**.

- **The Arrangement does not impede bona fide civil transactions and is not directed against any state or group of states.** All measures undertaken with respect to the Arrangement are in accordance with member countries' national legislation and policies and implemented on the basis of national discretion. **Hence statement 3 is correct.**

Source: [CLICK HERE](#)

Q.22) Consider the following statements with respect to 'Urban Co-operative Banks'

1. The term Urban Co-operative Banks (UCBs) formally defined as primary cooperative banks located in urban and semi-urban areas lends money only for non-agricultural purposes
2. Reserve Bank of India has classified UCB's into a four-tiered regulatory framework based on size of deposits of the UCBs
3. All the other regulatory parameters except minimum capital to adequacy ratio applies to UCB's

Choose the correct answer using the code given below

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

Q.22) Solution (b)

Explanation:

- The term Urban Co-operative Banks (UCBs), though not formally defined, refers to primary cooperative banks located in urban and semiurban areas. **These banks, till 1996, were allowed to lend money only for nonagricultural purposes. This distinction does not hold today. Hence statement 1 is not correct.**
- **Reserve Bank of India has classified UCB's into a four-tiered regulatory framework based on size of deposits of the UCBs.** The RBI has categorised all unit UCBs and salary earners' UCBs (irrespective of deposit size), and all other UCBs having deposits up to ₹100 crore in Tier 1. In Tier 2, it has placed UCBs with deposits more than ₹100 crore and up to ₹1,000 crore. Tier 3 will cover banks with deposits more than ₹1,000 crore and up to ₹10,000 crore. UCBs with deposits more than ₹10,000 crore have been categorised in Tier 4. **Hence statement 2 is correct.**

- RBI also has come out with norms pertaining to the net worth and capital adequacy of these banks. Tier 1 UCBs operating in a single district should have minimum net worth of ₹2 crore. For all other UCBs (in Tier 1, 2 and 3) tiers), the minimum net worth should be ₹5 crore. Tier 1 UCBs have to maintain a minimum capital to risk weighted assets ratio of 9 per cent of Risk Weighted Assets (RWAs) on an ongoing basis. Tier 2 to 4 UCBs have to maintain a minimum capital to risk weighted assets of 12 per cent of RWAs on an ongoing basis. **Hence statement 3 is not correct.**

Source: [CLICK HERE](#)

Q.23) Consider the following statements with respect to 'International Criminal Court'

1. It is the first and only permanent international court with jurisdiction to prosecute individuals for crimes against humanity and war crimes
2. The ICC is governed by the Assembly of States Parties, which is made up of the states that are party to the Rome Statute
3. For an individual to be prosecuted by the Court, territorial jurisdiction must always exist

Choose the correct answer using the code given below

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

Q.23) Solution (b)

Explanation:

- The International Criminal Court (ICC) is an **intergovernmental organization and international tribunal seated in The Hague, Netherlands**. It is the first and only permanent international court with jurisdiction to prosecute individuals for the international crimes of genocide, crimes against humanity, war crimes and the crime of aggression. **Hence statement 1 is correct.**
- **The ICC is governed by the Assembly of States Parties, which is made up of the states that are party to the Rome Statute.** The Assembly elects officials of the Court, approves its budget, and adopts amendments to the Rome Statute. The Court itself, however, is

composed of four organs: the Presidency, the Judicial Divisions, the Office of the Prosecutor, and the Registry. **Hence statement 2 is correct.**

- **For an individual to be prosecuted by the Court either territorial jurisdiction or personal jurisdiction must exist.**
- The personal jurisdiction of the Court extends to all natural persons who commit crimes, regardless of where they are located or where the crimes were committed, as long as those individuals are nationals of either (1) states that are party to the Rome Statute or (2) states that have accepted the Court's jurisdiction by filing a declaration with the Court.
- As with territorial jurisdiction, the personal jurisdiction can be expanded by the Security Council if it refers a situation to the Court. **Hence statement 3 is not correct.**

Source: [CLICK HERE](#)

Q.24) With reference to 'ChatGPT', consider the following statements

1. ChatGPT is a Language Model which can do creative tasks such as writing a story or a even a software application
2. The accuracy of ChatGPT or any language model cannot be measured using standard techniques.
3. This conversational bot has been developed by Global Partnership on Artificial Intelligence (GPAI)

Choose the correct answer using the code given below

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

Q.24) Solution (d)

Explanation:

- **ChatGPT is much more than a chat bot. For example, you can ask it to write a program or even a simple software application.**
- It can also do creative tasks such as writing a story. It can explain scientific concepts and answer any question that needs factual answers. ChatGPT is what is called a Language Model, rather than a chat bot.

- A language model is a software that prints out a sequence of words as output that are related to some words given as input with appropriate semantic relation; in practical terms, it means that it can perform tasks like answering questions and carrying on a conversation with humans. **Hence statement 1 is correct.**
- **The accuracy of ChatGPT or any language model can be measured using standard techniques.** One such technique is “Recall-Oriented Understudy for Gisting Evaluation” or the ROUGE metric which compares ChatGPT’s output of content against a standard expected content and measures the overlap as success percentage. **Hence statement 2 is not correct.**
- The tool has been developed by OpenAI, a research institute founded in 2015. **Hence statement 3 is not correct.**

Source: [CLICK HERE](#)

Q.25) ‘Paris Club’ seen in news recently is related to

- a) Denuclearization
- b) UNSC reforms
- c) Payment solutions
- d) Space technologies

Q.25) Solution(c)

Explanation:

- The **Paris Club** is a group of officials from major creditor countries whose role is to find coordinated and sustainable solutions to the payment difficulties experienced by debtor countries. India is not a member of this club.

Source: [CLICK HERE](#)

Q.26) A vessel contains milk and water in the ratio 3:2. The volume of the contents is increased by 50% by adding water to it. From this resultant solution 30 L is withdrawn and then replaced with water. The resultant ratio of milk water in the final solution is 3:7. Find the original volume of the solution.

- a) 80 L

- b) 65 L
- c) 75 L
- d) 82 L

Q.26) Solution (a)

Explanation:

Let the original volume be x.

then, quantity of milk and water,

= $3x/5$ and $2x/5$ respectively.

After adding water to it, the volume becomes 150%, the quantity of milk and water,

= $3x/5$ and $9x/10$

$$\left(\frac{3x}{5} - 12\right) / \left(\frac{9x}{10} + 12\right) = \frac{3}{7}$$

$$14(3x - 60) = 3(9x + 120)$$

Or, $x = 80$ L

Q.27) In a zoo, there are Rabbits and Pigeons. If heads are counted, there are 200 and if legs are counted, there are 580. How many pigeons are there?

- a) 90
- b) 100
- c) 110
- d) 120

Q.27) Solution (c)

Explanation:

Heads Count = 200

Legs count = 580

Average Legs count for per head = $580/200 = 29/10$

$$\begin{array}{ccc}
 \text{Rabbits}(4) & & \text{Pigeons}(2) \\
 & \diagdown & / \\
 & \frac{29}{10} & \\
 & / & \diagdown \\
 4 - \frac{29}{10} & : & \frac{29}{10} - 2 \\
 & \frac{11}{10} : \frac{9}{10} &
 \end{array}$$

Rabbits : Pigeons = $9/10 : 11/10 = 9:11$

Number of Pigeons = $200 \times 11/20 = 110$

Q.28) The ratio, in which tea costing Rs. 192 per kg is to be mixed with tea costing Rs. 150 per kg so that the mixed tea when sold for Rs. 194.40 per kg, gives a profit of 20%

- a) 2 : 5
- b) 3 : 5
- c) 5 : 3
- d) 5 : 2

Q.28) Solution (a)

Explanation:

CP of first tea = Rs. 192 per kg.

CP of Second tea = Rs. 150 per kg.

Mixture is to be sold in Rs. 194.40 per kg, which has included 20% profit. So,

SP of Mixture = Rs. 194.40 per kg.

Let the CP of Mixture be Rs. X per kg. Therefore,

$$X + 20\% \text{ of } X = SP$$

$$6x/5 = 194.40$$

$$6X = 194.40 * 5$$

$$X = \text{Rs. } 162 \text{ per kg.}$$

Let N kg of first tea and M kg of second tea to be added.

Now, Using Alligation,

We get,

$$\begin{array}{ccc}
 192 & & 150 \\
 & \diagdown & / \\
 & 162 & \\
 & / & \diagdown \\
 (162-150) & : & (192-162)
 \end{array}$$

$$N/M = 12/30$$

$$N:M = 2:5$$

Q.29) How many litres of water should be added to a 30 litre mixture of milk and water containing milk and water in the ratio of 7:3 such that the resultant mixture has 40% water in it?

- a) 5
- b) 2
- c) 3

d) 8

Q.29) Solution (a)

Explanation:

Total quantity of mixture

$$= \frac{7}{7+3} \times 30 \text{ litres}$$

$$= 21 \text{ litres}$$

And quantity of water in the mixture

$$= \frac{3}{7+3} \times 30 \text{ litres}$$

$$= 9 \text{ litres}$$

Let water to be mixed 'a' litre

Then,

$$\Rightarrow (30+a) \times \frac{40}{100} = 9 + a$$

$$\Rightarrow (30+a) \times \frac{40}{100} = 9 + a$$

$$\Rightarrow 120 + 4a = 90 + 10a$$

$$\Rightarrow 120 - 90 = 10a - 4a$$

$$\Rightarrow 30 = 6a$$

$$\Rightarrow a = 5$$

Hence, 5 litres water mixed in the mixture.

Read the following passage and answer the item that follow. Your answer to these items should be based on the passages only

Passage 1

Planning Sustainable Cities report reviews recent urban planning practices and approaches, discusses constraints and conflicts existing, and identifies innovative approaches that are more responsive to current challenges of urbanization. It notes that traditional approaches to urban planning (particularly in developing countries) have largely failed to promote equitable, efficient and sustainable human settlements and to address twenty-first century challenges, including rapid urbanization, shrinking cities and ageing, climate change and related disasters, urban sprawl and unplanned peri-urbanization, as well as urbanization of poverty and informality. It concludes that new approaches to planning can only be meaningful, and have a greater chance of succeeding, if they effectively address all of these challenges, are participatory and inclusive, as well as linked to contextual socio-political processes.

Q.30) According to the passage, which of the following can be said about the urban planning?

1. In order to provide sustainable and efficient human settlements it is required to make a shift in Urban planning from traditional approach
2. The problems of urbanisation in the twenty first century can be dealt with participative and inclusive approaches that are more responsive

Select the correct answer using the codes given below:

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

Q.30) Solution (c)

Explanation:

Refer to, "It notes that traditional approaches to urban planning (particularly in developing countries) have largely failed to promote equitable, efficient and sustainable human settlements"

And "It concludes that new approaches to planning can only be meaningful, and have a greater chance of succeeding, if they effectively address all of these challenges, are participatory and inclusive, as well as linked to contextual socio-political processes." Hence, option c is correct.