Q.1) Which among the following are physical processes in soil formation?

1. Lateralization
2. Podzolization
3. Salinization
4. Gleization

Choose the correct option:

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

Q.1) Solution (d)

Basic Information:

- Soil forming processes are aggregate of many interrelated physical, chemical and biological processes.
- Physical processes:
  - Lateralization
  - Calcification
  - Salinization
  - Alkalinization
- Chemical processes:
  - Podzolisation/ Chelation/ Cheluviation
  - Gleization

***Note*:** Only Physical processes were asked in the question.

Q.2) With reference to "factors controlling the soil formation", consider the following statements:

1. Relief determines the fertility of soil.
2. Parent material determines the texture of soil.

Which of the above statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2

d) Neither 1 and 2

Q.2) Solution (c)

Basic Information:

- There are five basic factors controlling the formation of soils:
  I. parent material
  II. topography
  III. climate
  IV. biological activity
  V. time
- Climate and biological activity are considered **active agents** due to their intensity and influence in soil formation.
- Other factors like topography, parent material and time are **passive factors**.

Statement Analysis:

Statement 1	**Statement 2**
Correct	**Correct**
Topography/Relief is a passive factor in soil formation. The slopes or steepness can **regulate soil erosion and degradation**. Thus, steep slopes leads to swift flow of water which prevents soil formation as well as leads to soil erosion. Example: Chambal ravine. Low relief or gentle slope leads to deposition and thus deep soils are formed. Example: thick layers of fertile alluvial soils in North India.	Parent material determines both the physical as well as chemical characteristics of soil. It determines the **colour**, **mineral composition** and **texture** of soil.

Q.3) Consider the following statements:

1. Clayey soil has the highest water holding capacity.

2. Soil texture tells about the workability of soil.

Which of the above statements is/are correct?

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

Q.3) Solution (a)

Basic Information:

Soil Characteristics:

I. **Soil Texture**:
- Soil is made up of different-sized particles. Soil texture refers to the size of the particles that make up the soil and depends on the proportion of sand, silt and clay-sized particles and organic matter in the soil.
- Sandy soils feel gritty when rubbed between your fingers. Silts feel smooth – a little like flour. Most clays are sticky and mouldable.
- Soils are made up of different combinations of sand, silt and clay particles. Soils that are a mixture of sand, silt and clay are called **loams**.

II. **Soil structure:**
- Soil structure describes the way the sand, silt and clay particles are clumped together.
- Organic matter (decaying plants and animals) and soil organisms like earthworms and bacteria influence soil structure.
- Clays, organic matter and materials excreted by soil organisms bind the soil particles together to form aggregates.
- Soil structure is important for plant growth, regulating the movement of air and water, influencing root development and affecting nutrient availability.
- Good quality soils are friable (crumbly) and have fine aggregates so the soil breaks up easily if you squeeze it.
- Poor soil structure has coarse, very firm clods or no structure at all.

III. **Soil porosity:**
- Porosity of soil controls the flow of water, its intake, drainage, and air ventilation (aeration).

- Coarse textured soils like sand have larger pore spaces than fine textured soils like clay or silt. Soil aeration is greatly influenced by pore spaces.
- Soil aeration regimes are very important in growth of roots, seed germination and microbial activities. Poor aeration suppresses root development and may reduce rates of absorption of water and nutrients.

Statement Analysis:

Statement 1	Statement 2
Correct	**Incorrect**
The water holding capacity is highest in **clayey soil** because it is made up of **very small tightly packed particles** that do not allow water to percolate.	**Soil texture** tells about the **water holding capacity of soil** or water availability to the soil. **Soil structure** tells about the **workability** (relative ease of tilth) of soil.

Q.4) Consider the following statements:

1. Pedocals are formed in humid conditions whereas pedalfars forms in arid and semi-arid conditions.
2. Pedalfars are acidic soil.
3. Pedocals have low organic content.

Which of the above statements is/are not correct?

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

Q.4) Solution (a)

Basic Information:

Pedocals:

- Pedocals are soils that are found in arid, semi-arid and the sub-humid zones in the world.

- Pedocals are very rich in calcium and mineral salts.
- With only a thin A horizon (topsoil), and intermittent precipitation calcite, other soluble minerals ordinarily removed by water may build up in the B horizon (subsoil) forming a cemented layer known as caliche.
- pH ranges from neutral to alkaline.
- There are 3 types of pedocals:
  - Seirozem (Desert soil)
  - Chernozem
  - Chestnut soil

Pedalfars:

- Pedalfer is composed of aluminum and iron oxides.
- Pedalfers usually occur in **humid areas**.
- Pedalfers have three subdivisions of which one is Lateritic soils.
- Pedalfer is a formative element in the United States soil taxonomic system for the **Alfisols** soil order. **Alf** is the formative element in the Alfisol name, and refers to aluminium (Al) and iron (Fe).

Statement Analysis:

Note: incorrect statements are asked.

Statement 1	Statement 2	Statement 3
Incorrect	**Correct**	**Correct**
Pedalfars are formed **in humid conditions** whereas **Pedocals** forms in **arid and semi-arid conditions.**	Pedalfars are acidic soil with pH less than 7.	Pedocal is rich in calcium carbonate and has low soil organic matter.

Q.5) Which of the following is/are correctly matched?

	Soil	***Remedy***
1.	Acidic soil	Gypsum
2.	Alkaline soil	Lime

3. Saline soil Leaching

Select the correct option using the codes given below:

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

Q.5) Solution (c)

Basic Information:

- In high **rainfall areas**, **acidic soils** are formed due to leaching of bases or salts.
- In **arid regions** where rainfall is low and temperature high, soils become **saline** or **alkaline** due to alkaline due to **accumulation of salts** in the surface soil.
- Effect of soil acidity on plants:
  - It has toxic effect on root tissues and adversely affects the permeability.
  - It disturbs the balance between basic and acidic constituents of the plant affects growth of plants.
  - It affects enzymic changes which are particularly sensitive to pH changes.
  - It affects the beneficial activity of soil micro-organisms.
  - Elements like aluminum, manganese andirons are highly soluble in acid medium excess amount causes toxic effect.
  - Due to soil acidity, calcium and potassium may be deficient.
  - It affects the availability e.g. phosphorus, copper and zinc.
  - Plant diseases are more prevalent in acidic soils.

	Soil	Remedy
1.	Acidic soil	Lime addition
2.	Alkaline soil	Gypsum
3.	Saline soil	Leaching

Q.6) Consider the following conditions:

1. Average rainfall of less than 75 cms.
2. Mean Annual temperature about 25-30 degree centigrade.

3. Mean Humidity less than 50 percent.
4. Trees found are low and widely scattered.

Which of the following forests type characterizes above mentioned conditions?

a) Tropical Dry Deciduous Forests
b) Montane Subtropical Forests
c) Tropical Thorn Forests
d) Swamp Forests

Q.6) Solution (c)

Basic Information:

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

Main Type	Sub Type
Moist Tropical Forests	• Tropical Wet Evergreen • Tropical Semi-Evergreen • Tropical Moist Deciduous • Littoral and Swamp
Dry Tropical Forests	• Tropical Dry Evergreen • Tropical Dry Deciduous • Tropical Thorn
Montane Subtropical Forests	• Subtropical Broad Leaved Hill • Subtropical Moist Hill (Pine) • Subtropical Dry Evergreen
Montane Temperate Forests	• Montane Wet Temperate • Himalayan Moist Temperate • Himalayan Dry Temperate
Alpine Forests	• Sub-Alpine • Moist Alpine Scrub • Dry Alpine Scrub

Tropical Thorn Forests are found in Rajasthan, western Kachchh, Saurashtra and in parts of Karnataka and Tamil Nadu. Trees here are widely scattered and low in height. Important species

are Neem, Cacti, Babool, Khejri etc.

Q.7) Teak, Axlewood and Tendu are the trees of which type of forests in India?

a) Tropical Evergreen Forests
b) Montane Forests
c) Tropical Thorn Forests
d) Tropical Deciduous Forests

Q.7) Solution (d)

Basic Information:

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

Q.8) Arrange the following sources of renewable energy in descending order in terms of their percentage of the global renewable power generation capacity.

1. Hydropower
2. Solar power

3. Wind energy
4. Bioenergy

Choose the correct option:

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

Q.8) Solution (b)

Basic Information:

Hydropower:

- Hydropower is the most widely-used renewable power source, with the global hydroelectric installed capacity exceeding 1,295GW, accounting for more than 18% of the world's total installed power generation capacity and more than **54%** of the global renewable power generation capacity.
- China has the biggest hydroelectric generation capacity in the world and hosts the world's largest hydropower plant, the Three Gorges (22.5GW).

Wind energy:

- Wind is the **second** most widely used renewable energy source, as global installed wind power capacity exceeded 563GW in 2018, accounting for approximately 24% of the world's total renewable energy generation capacity.
- China, with an installed capacity of more than 184GW, is the biggest wind energy generator in the world, followed by the US (94GW by the end of 2018).

Solar power:

- More than 486GW of installed capacity makes solar the **third biggest** renewable power source in the world, with photovoltaic (PV) technology being dominant.
- The use of concentrating solar power (CSP) technology is also on the rise, with global CSP installed capacity reaching 5.5GW by the end of 2018.
- China, US, Germany, Japan, Italy, and India possess the biggest solar PV capacity in the world, while Spain has 42% of the global CSP capacity.

Bio-power:

- Bio-power is the **fourth biggest** renewable power source after hydro, wind and solar. The world's net electricity production capacity from bio-mass currently exceeds 117GW, while global bio-power generation increased from 317TWh in 2010 to more than 495TWh in 2018.
- The US, Brazil, China, India, Germany, and Sweden are currently the leading bio-power generators in the world.

Q.9) With reference to "unconventional sources of natural gas", consider the following statements:

1. Shales are fine-grained sedimentary rocks.
2. China is estimated to have the world's largest shale gas reserves.
3. Coalbed Methane extraction falls under Ministry of Coal.

Which of the above statements is/are correct?

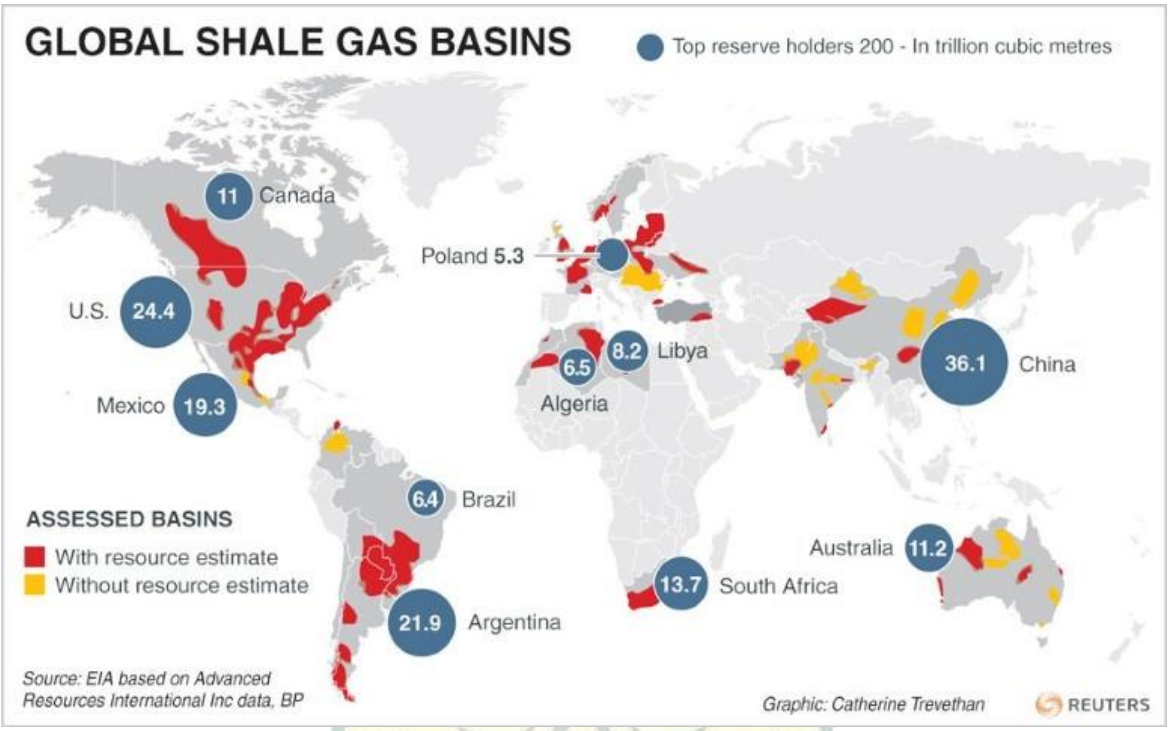
a) 1 and 2 only
b) 1 and 3 only
c) 2 and 3 only
d) 1, 2 and 3

Q.9) Solution (a)

Basic Information:

Shale Gas:

- Shales are **fine-grained sedimentary rocks** formed of organic-rich mud at the bottom of ancient seas.
- Subsequent sedimentation and the resultant heat and pressure transformed the mud into shale and also produced natural gas from the organic matter contained in it.
- Over long spans of geologic time, some of the gas migrated to adjacent sandstones and was trapped in them, forming conventional gas accumulations.
- The rest of the gas remained locked in the nonporous shale.



Coalbed Methane (CBM):

- CBM, like shale gas, is extracted from what are known as unconventional gas reservoirs — where gas is extracted directly from the rock that is the source of the gas (shale in case of shale gas and coal in case of CBM).
- The methane is held underground within the coal and is extracted by drilling into the coal seam and removing the groundwater.
- The resulting drop in pressure causes the methane to be released from the coal.
- With one of the largest proven coal reserves, and one of the largest coal producer in the world, India holds significant prospects for commercial recovery of coalbed methane.

Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Correct**	**Incorrect**
Shales are **fine-grained sedimentary rocks** formed of organic-rich mud at the bottom of ancient seas.	Refer to the world map.	**CBM extraction** falls under **Ministry of Petroleum & Natural Gas** whereas coal mining

		falls under Ministry of Coal.

Q.10) Consider the following statements:

1. India has increased its non-fossil fuel target to 450 GW by 2030.
2. IRIX is a platform initiated by Ministry of New and Renewable Energy.

Which of the above statements is/are correct?

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

Q.10) Solution (c)

Basic Information:

India's renewable power capacity is the **fourth largest** in the world and is growing at the fastest speed among all major countries.

The renewable energy capacity in India is currently **136 Giga Watts,** which is about **36%** of its total capacity.

Statement Analysis:

Statement 1	**Statement 2**
Correct	**Correct**
At the United Nations Climate Action Summit, Prime Minister Narendra Modi had announced increasing the renewable energy target to **450 GW** by **2030** from 175 GW by 2022.	Initiated and moderated by the Ministry of New and Renewable Energy (MNRE), **IRIX** is a platform that promotes the exchange of ideas among energy conscious Indians and the Global community.

Q.11) Consider the following statements about gleization:

1. It is a dominant process in well-drained soils.
2. High rainfall always results in the formation of glays.

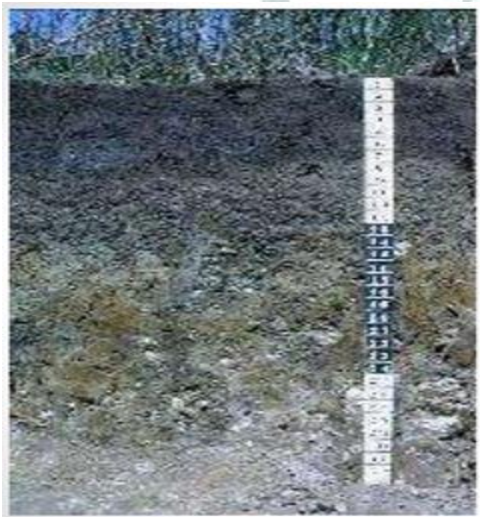
Which of the following statements is/are correct?

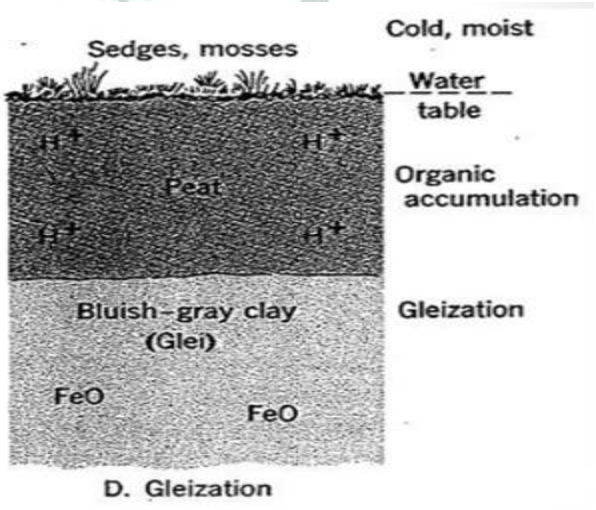
a) 1 only
b) 2 only
c) Both 1 and 2
d) Neither 1 nor 2

Q.11) Solution (d)

Basic Information:

- The term 'glei' is of Russian origin which means blue, grey or green clay.
- Gleization is a process of soil formation resulting in the development of a glei (or gley horizon) in the lower part of the soil profile above the parent material due to poor drainage condition (lack of oxygen) and where waterlogged conditions prevail.
- The process is not particularly dependent on climate (high rainfall as in humid regions) but often on drainage conditions.
- Under reducing conditions, due to ferrous compounds, the soil colour becomes blue-grey or grey, and the rate of decomposition of organic matter is very low. These together results into the accumulation of a sticky compact layer of blue-grey or grey colour at the bottom of B- horizon. This process is called 'gleization' and the soil is called 'glays'.





Statement Analysis:

Statement 1	Statement 2

Incorrect	Incorrect
Gleization takes place in poorly drained soils.	Not rainfall, but topography is the dominant factor. High rainfall in a well-drained soil will result into formation of glays.

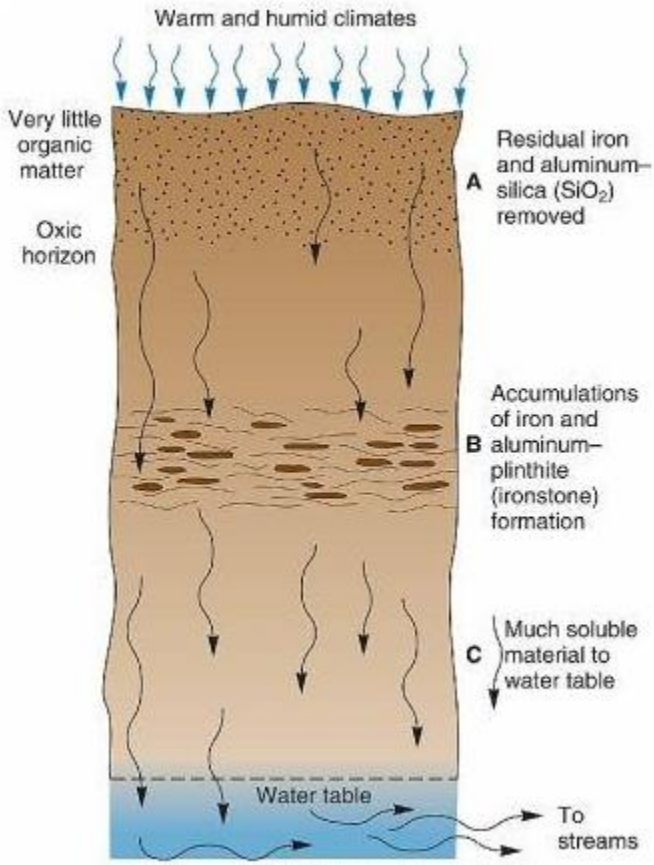
Q.12) Select the incorrect statement about laterization:

a) This is a dominant process in high rainfall areas within the tropics.
b) Sesquioxides get leached away due to heavy rainfall.
c) Eluviated layer of the soil contains very little silica.
d) Laterite soils are not very fertile.

Q.12) Solution (b)

Basic Information:

- Laterization refers specifically to a particular cemented horizon in certain soils which when dried, become very hard, like a brick.
- Such soils (in tropics) when massively impregnated with aluminium and iron sesquioxides to the extent of 70 to 80% of the total mass, are called laterites. The soil forming process is called Laterization.
- Under high temperature regimes and high rainfall in the tropics, the silicate minerals are very unstable and get leached away.
- These sesquioxides of the parent minerals are resistant to decomposition. It leaves a residue of primary laterite.
- The process operates under the following conditions.
    - Climate- Unlike podzolization, the process of laterization operates most favourable in warm and humid (tropical) climate with 2000 to 2500 mm rainfall and continuous high temperature (25°C) throughout the year.
    - Natural vegetation- The rain forests of tropical areas are favourable for the process.
    - Parent Material- Basic parent materials, having sufficient iron bearing ferromagnesian minerals, which on weathering release iron, are congenial for the development of laterites.



Q.13) Consider the following statements about soil structure:

1. It is the arrangement of the solid parts of the soil and of the pore spaces located between them.
2. The soil structure is enhanced under most types of cultivation.
3. Biological activity affects soil structure.

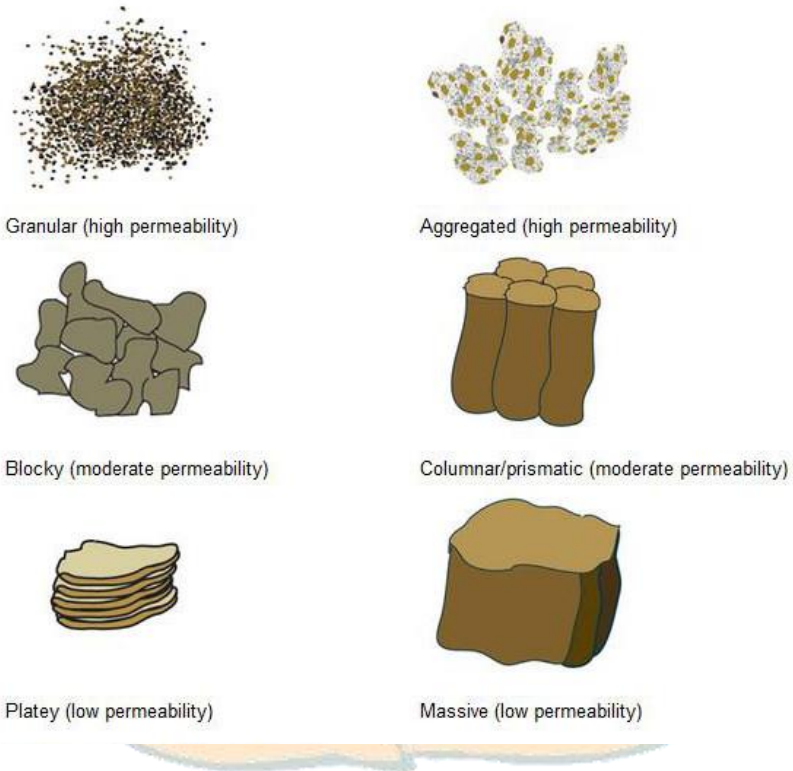
Which of the following statements is/are correct?

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

Q.13) Solution (c)

- Soil structure describes the arrangement of the solid parts of the soil and of the pore spaces located between them.

- Aggregation is the result of the interaction of soil particles through rearrangement, flocculation and cementation. It is enhanced by: the precipitation of oxides, hydroxides, carbonates and silicates; the products of biological activity (such as biofilms, fungal hyphae and glycoproteins); ionic bridging between negatively charged particles (both clay minerals and organic compounds) by multivalent cations; and interactions between organic compounds (hydrogen bonding and hydrophobic bonding).
- The quality of soil structure will **decline under most forms of cultivation**—the associated mechanical mixing of the soil compacts and shears aggregates and fills pore spaces; it also exposes organic matter to a greater rate of decay and oxidation. A further consequence of continued cultivation and traffic is the development of compacted, impermeable layers or 'pans' within the profile.



Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Incorrect**	**Correct**
Structure can be understood as	Most cultivation degrades the	Biological activity such as biofilms can enhance soil

shape of soil aggregates.	soil structure.	structure.

Q.14) Consider the following statements related to soil pH:

1. Soil pH has a huge effect on the solubility of minerals and nutrients in the soil.
2. Rainwater leaching away basic ions can increase pH.

Which of the following statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2 are correct.
d) Neither 1 nor 2 is correct.

Q.14) Solution (a)

Basic Information:

- The effect of soil pH is great on the solubility of minerals or nutrients. Fourteen of the seventeen essential plant nutrients are obtained from the soil. Before a nutrient can be used by plants it must be dissolved in the soil solution. Most minerals and nutrients are more soluble or available in acid soils than in neutral or slightly alkaline soils.
- Soils tend to **become acidic (decrease in pH)** as a result of: (1) rainwater leaching away basic ions (calcium, magnesium, potassium and sodium); (2) carbon dioxide from decomposing organic matter and root respiration dissolving in soil water to form a weak organic acid; (3) formation of strong organic and inorganic acids, such as nitric and sulfuric acid, from decaying organic matter and oxidation of ammonium and sulfur fertilizers. Strongly acid soils are usually the result of the action of these strong organic and inorganic acids.
- Lime is usually added to acid soils to increase soil pH.

Statement Analysis:

Statement 1	**Statement 2**
Correct	**Incorrect**
Most minerals and nutrients are more soluble or available in acid soils.	This process will increase acidity in the soil, thus the pH will decrease.

Q.15) Consider the following statements about peaty soils in India:

1. Peaty soils are found in areas of high rainfall.
2. Peaty soils are highly acidic.
3. Peaty soils are found in north-west Bihar.

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

a) 1 only
b) 2 only
c) 3 only
d) None of the above.

Q.15) Solution (d)

Basic Information:

- Peaty or marshy soils contain 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.
- They are found in Kottayam and Alappuzha districts of Kerala where it is called kari.
- They also occur in the coastal areas of Odisha and Tamil Nadu, Sunderbans of West Bengal, north-west Bihar and Almora district of Uttarakhand.
- Most of the peaty soils are under water during the rainy season but as soon the rains cease, they are put under paddy cultivation.

Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Correct**	**Correct**
High rainfall makes this soil marshy.	Due to high organic content and their decomposition, these soils turn acidic.	See distribution of peaty soil.

Q.16) Which of the following statements is incorrect among the given options?

a) Forest soils are high in soil organic carbon.
b) Forest soils are neutral to slightly alkaline in character.

c) High organic content helps in retention of soil moisture.
d) All the above statements are correct.

Q.16) Solution (b)

Basic Information:

- Forest soils form where it is not too hot, and not too cold. The type of soil that forms depends on what type of vegetation grows.
- Soils that formed under deciduous forests are very fertile and productive agricultural lands because of the decomposing leaves at the soil surface. However, soils formed under pine trees are usually more acidic and sandy, and are less suited to growing crops.
- Forests are very important, as they store a great deal of carbon in the leaves, trees, and soil, which is why it is important to protect the forests.
- High organic content helps in keeping the soil moisture intact for longer duration of time.
- Due to presence of more organic content, these soils are acidic in nature.

Q.17) Consider the following statements about humus:

1. Humus is formed due to the process called mineralization.
2. Humus has a dark color due to accumulation of organic carbon.

Which of the following statements is/are correct?

a) 1 only
b) 2 only
c) Both 1 and 2 are correct.
d) Neither 1 nor 2 is correct.

Q.17) Solution (b)

Basic Information:

- Humus is the dark organic matter that forms in soil when dead plant and animal matter (including aerobic compost) breaks down further, specifically through the action of anaerobic organisms. Humus has many nutrients that improve the health of soil, nitrogen being the most important. The ratio of carbon to nitrogen (C:N) of humus is 10:1.

- Microorganisms decompose a large portion of the soil organic matter into inorganic minerals that the roots of plants can absorb as nutrients. This process is termed "mineralization". In this process, nitrogen (nitrogen cycle) and the other nutrients (nutrient cycle) in the decomposed organic matter are recycled. Depending on the conditions in which the decomposition occurs, a fraction of the organic matter does not mineralize, and instead is transformed by a process called "**humification**" into concatenations of organic polymers. Because these organic polymers are resistant to the action of microorganisms, they are stable, and constitute humus. This stability implies that humus integrates into the permanent structure of the soil, thereby improving it.
- Organic matter is humified by a combination of saprotrophic fungi, bacteria, microbes and animals such as earthworms, nematodes, protozoa, and arthropods.
- Much of the humus in most soils has persisted for more than 100 years, rather than having been decomposed into CO2, and can be regarded as stable; this organic matter has been protected from decomposition by microbial or enzyme action because it is hidden (occluded) inside small aggregates of soil particles
- Humus has a characteristic black or dark brown color and is organic due to an accumulation of organic carbon.

Statement Analysis:

Statement 1	Statement 2
Incorrect	**Correct**
Humus is formed due to humification.	Humus has a characteristic black or dark brown colour and is organic due to an accumulation of organic carbon.

Q.18) Consider the following statements about the Taiga Biome:

1. It is the largest land biome.
2. These are dense forests formed due to heavy precipitation throughout the year.
3. Fire has been one of the important factors shaping the taiga forests.

Which of the following statements is/are correct?

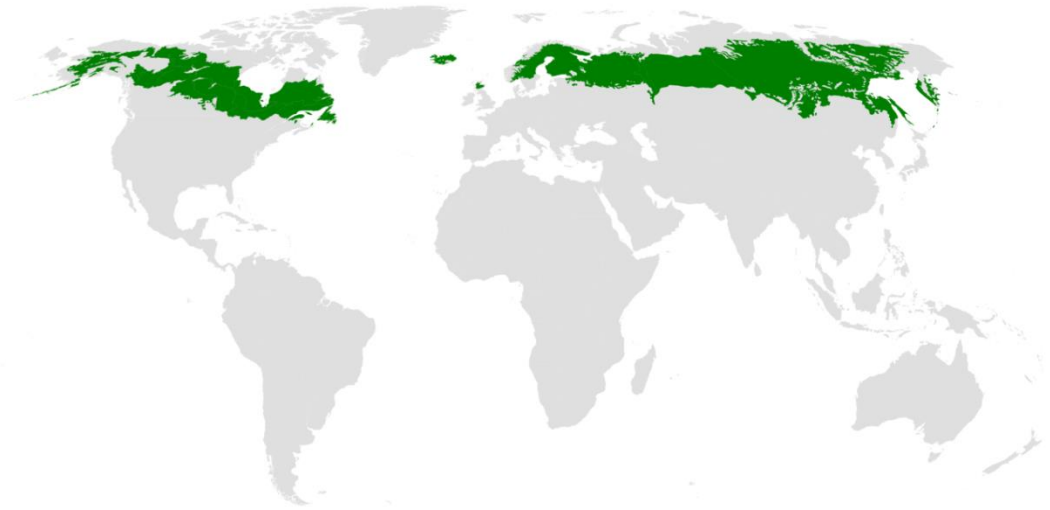
a) 3 only
b) 1 and 2 only
c) 1 and 3 only

d) 1 only

Q.18) Solution (a)

Basic Information:

- Taiga, generally referred to in North America as boreal forest or snow forest, is a biome characterized by coniferous forests consisting mostly of pines, spruces, and larches.
- In North America, it covers most of inland Canada, Alaska, and parts of the northern contiguous United States. In Eurasia, it covers most of Sweden, Finland, much of Russia from Karelia in the west to the Pacific Ocean (including much of Siberia), much of Norway and Estonia, some of the Scottish Highlands, some lowland/coastal areas of Iceland, and areas of northern Kazakhstan, northern Mongolia, and northern Japan.



- The taiga experiences relatively low precipitation throughout the year (generally 200–750 mm annually and upto 1,000 mm in some areas), primarily as rain during the summer months, but also as snow or fog.
- As evaporation is consequently low for most of the year, annual precipitation exceeds evaporation, and is sufficient to sustain the dense vegetation growth including large trees.
- Fire has been one of the most important factors shaping the composition and development of boreal forest stands; it is the dominant stand-renewing disturbance through much of the Canadian boreal forest.

- Taiga covers 17 million square kilometres (6.6 million square miles) or 11.5% of the Earth's land area, second only to deserts and xeric shrublands. The largest areas are located in Russia and Canada. However, it is the most consistent largest land biome.

Statement Analysis:

Statement 1	Statement 2	Statement 3
Incorrect	**Incorrect**	**Correct**
It is second largest area wise.	Rainfall is low, but effective rainfall is high.	Frequency of fires is low, but it is significantly modified by the fire.

Q.19) Match the following grasslands with its area of existence.

1. Chaurs — A. Brahmaputra plains
2. Terai grasslands — B. Gujarat
3. Vidis — C. Satpuras
4. Valley grasslands — D. Himachal Pradesh

Select the correct options:

a) 1-A,2-D,3-C,4-B
b) 1-D,2-A,3-B,4-C
c) 1-C,2-A,3-B,4-D
d) 1-C,2-A,3-C,4-B

Q.19) Solution (b)

Basic Information:

- Grasslands occupy nearly **24 percent** of the geographical area in India.
- According to Rawat and Adhikari (2015), the major types of grasslands in India are
  i) the alpine moist meadows of the Greater Himalayas;
  ii) alpine arid pastures or steppe formations of the trans Himalayas;
  iii) hillside grasslands in the mid-elevation ranges of the Himalayas;
  iv) 'Chaurs' of the Himalayan foothills;
  v) 'Terai' grasslands on the Gangetic and the Brahmaputra floodplains;
  vi) 'Phumdis' or floating grasslands of Manipur;

vii) 'Banni' and 'Vidis' of Gujarat;
viii) savannas of western and peninsular India;
ix) plateau and valley grasslands in the Satpuras and Maikal hills;
x) dry grasslands of the Andhra Pradesh and Tamil Nadu plains and
xi) 'Shola' grasslands of the Western Ghats.

Q.20) Consider the following statements about gas hydrates:

1. Gas hydrates are a type of clathrate compound.
2. Gas hydrates are found in areas of high pressure and low temperature conditions.
3. A large reserve of gas hydrates have been discovered in the Arabian Sea off the Mumbai coast.

Which of the following statements is/are correct?

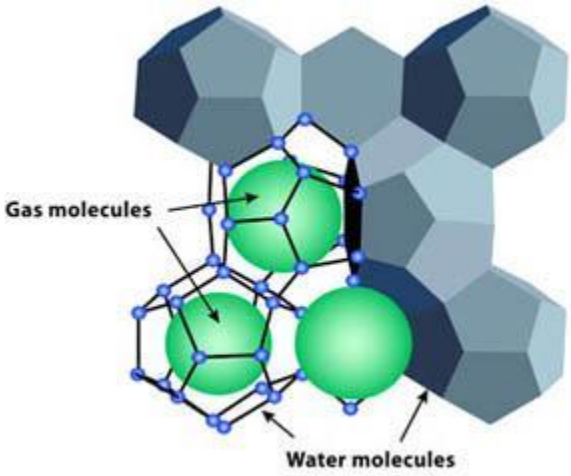
a) 1 and 3 only
b) 1 only
c) 2 only
d) 1 and 2 only

Q.20) Solution (d)

Basic Information:

What are gas hydrates?

- Gas hydrates are a crystalline solid formed of water and gas. It looks and acts much like ice, but it contains huge amounts of methane; it is known to occur on every continent; and it exists in huge quantities in marine sediments in a layer several hundred meters thick directly below the sea floor and in association with permafrost in the Arctic. It is not stable at normal sea-level pressures and temperatures, which is the primary reason that it is a challenge to study.



- The hydrate reservoir may have strong influence on the environment and climate, because methane is a significant greenhouse gas.
- Gas hydrate deposits are found wherever methane occurs in the presence of water under **elevated pressures and at relatively low temperatures**, such as beneath permafrost or in shallow sediments along deepwater continental margins.
- Methane that forms hydrate can be both biogenic, created by biological activity in sediments, and thermogenic, created by geological processes deeper within the earth.
- Once assumed to be rare, gas hydrates are now thought to occur in vast volumes and to include 250,000–700,000 trillion cubic feet of methane and the formation thickness can be several hundred meters thick.
- ONGC has struck gas hydrate reserves in the deep sea off the Andhra Pradesh coast. The reserves are located in the Krishna-Godavari basin.

Statement Analysis:

Statement 1	Statement 2	Statement 3
Correct	**Correct**	**Incorrect**
Clathrate compounds are also called "caged" compounds. See the diagram.	In high temperature conditions ice cubes won't be formed.	Discovery has taken place in the Bay of Bengal region.

Q.21) Subhash Chandra Bose was elected as President of the Indian National Congress in which of the following two sessions?

1. Haripur Session
2. Ramgarh Session
3. Faizpur Session
4. Tripuri Session

Select the correct answer using the code given below:

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

Q.21) Solution (d)

- On 23rd January, 2021, India celebrated the 125th birth anniversary of Netaji Subhas Chandra Bose as 'Parakram Divas.'
- **Subhash Chandra Bose was twice elected President of the Indian National Congress, i.e. 1938-Haripur and 1939-Tripuri.**
- Owing to political differences, he resigned from the Congress Presidentship in 1939 and organised the All India Forward Bloc a faction within the Congress in Bengal.
- 1937-Faizpur Session presided by Jawaharlal Nehru.
- 1940-Ramgarh Session presided by Abul Kalam Azad.

Q.22) Which of the following are reasons behind increasing human wildlife conflicts in recent past?

1. Loss of Habitat
2. Adverse climatic events
3. Over grazing

Select the correct answer using the code given below:

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

Q.22) Solution (d)

- Some of the causes of human wildlife conflict are:
  i. Expanding human settlement resulting **Habitat loss** and fragmentation
  ii. Agricultural expansion and deforestation
  iii. Illegal grass collection and **over grazing** by livestock
  iv. Global warming and Climate change
  v. **Adverse climatic events** such as droughts, floods

Q.23) Changalikodan is a banana variety originated and cultivated in which of the following State of India?

a) Kerala
b) Andhra Pradesh
c) Tamil Nadu
d) Telangana

Q.23) Solution (a)

- **Changalikodan Nendran Banana** or famously known as Changalikodan is a banana variety originated and cultivated in Chengazhikodu village of **Thrissur District in Kerala**.
- Changalikodan, now are cultivated on the banks of the Bharathapuzha river.
- Changalikodan got Geographical indication registration from the Geographical Indications Registry, Chennai.
- Recently scientists have come up with a new product, banana grit or granules, developed from raw Nendran bananas. Banana grit is an ideal ingredient for a healthy diet; it can be used for making a wide range of dishes.

Q.24) With reference to the South Asia Group for Energy (SAGE), consider the following statements:

1. It is a high-level group for South Asia energy security.
2. It has been set up under the Ministry of External Affairs.

Which of the statements given above is/are correct?

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

Q.24) Solution (c)

Statement 1	Statement 2
Correct	**Correct**
The Central Government has set up South Asia Group for Energy (SAGE), **a high-level group to build a South Asia-focused energy security architecture.** It will be headed by former Union Power Secretary Ram Vinay Shahi. Its objective is to achieve a balanced and optimal development of energy infrastructure through mutual understanding and cooperation	**SAGE has been set up under the Ministry of External Affairs (MEA)**-run think tank Research and Information System for Developing Countries (RIS).

Q.25) Which of the following Acts empowered the Government to notify the Temporary Suspension of Telecom Services (Public Emergency or Public Safety) Rules, 2017?

a) National Security Act, 1980
b) Information Technology Act, 2000
c) Indian Telegraph Act of 1885
d) Maintenance of Internal Security Act, 1971

Q.25) Solution (c)

- The Section 5(2) of **Indian Telegraph Act, 1885** allows central and state governments to prevent the transmission of messaging during a "public emergency or in the interest of public safety", or "in the interests of the sovereignty and integrity of India, the security of the state".
- Under the Indian Telegraph Act of 1885, only the Home Secretary of the central or the state government can pass orders to enforce an Internet shutdown in any area.
- In August 2017, the Centre promulgated the Temporary Suspension of Telecom Services (Public Emergency or Public Safety) Rules, 2017. Before these rules, the internet shutdowns were imposed largely under Section 144 of the Code of Criminal Procedure (CrPC).

Q.26) Consider the following research stations:

1. Bharati
2. Dakshin Gangotri
3. Maitri
4. Himadri

Which of the research stations given above are operational in Antarctica?

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

Q.26) Solution (c)

- The 40th Indian Scientific Expedition to Antarctica was flagged off on January 05, 2021, from Mormugao Port, Goa. The chartered ice-class vessel MV Vasiliy Golovnin has been chosen for the prestigious 40th Indian Scientific Expedition to Antarctica (ISEA) mission journey and will reach Antarctica in 30 days.
- The Indian Antarctic expeditions began in 1981.
- The Indian Antarctic programme has now been credited to have built three permanent research base stations in Antarctica—named Dakshin Gangotri, Maitri, and Bharati.

- As of today, **India has two operational research stations in Antarctica named Maitri and Bharati.**
- Himadri is India's first permanent Arctic research station located at Spitsbergen, Svalbard, Norway.

Q.27) Consider the following statements:

1. Provision Coverage Ratio (PCR) is the ratio of provisioning to gross non-performing assets.
2. A high PCR ratio means that the bank is more vulnerable.

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.27) Solution (a)

Statement 1	Statement 2
Correct	**Incorrect**
The Provisioning Coverage Ratio (PCR) is the percentage of bad assets that the bank has to provide for from their own funds i.e. **ratio of provisioning to gross non-performing assets**. In other words, it is the ability of banks to service its debt and meet its financial obligations such as interest payments or dividends.	The higher the coverage ratio, the easier it is to make interest payments on debt or pay dividends i.e. **a high PCR ratio (ideally above 70%) means most asset quality issues have been taken care of and the bank is not vulnerable.**

Q.28) The West bank territory of Western Asia borders with which of the following country?

a) Lebanon
b) Syria

c) Jordan
d) Egypt

Q.28) Solution (c)

- The **West Bank** is a landlocked territory near the Mediterranean coast of Western Asia, **bordered by Jordan** and the Dead Sea to the east and by Israel to the south, west and north.

Q.29) Consider the following statements regarding the Aqua Rejuvenation Plant (ARP):

1. It is an Integrated Waste Water Rejuvenation Model which has two-stage purification profile for comprehensive treatment of waste water.
2. The filtered sludge generated is utilized as manure.
3. It facilitates an organic farming model through treated waste water.

Which of the statements given above is/are correct?

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

d) 1, 2 and 3

Q.29) Solution (c)

Statement 1	Statement 2	Statement 3
Incorrect	**Correct**	**Correct**
Aqua Rejuvenation Plant (ARP) is an Integrated Waste Water Rejuvenation Model which has **Six-Stage purification profile** for comprehensive treatment of Waste Water, based upon diverse purification parameters.	The used filtration media have been specially developed to handle Indian Sewage Water Parameters and based upon Geographical Variations they may be modified. The system has dual benefit. While the treated water is being used for irrigation purpose, the **filtered sludge generated is also utilized as manure / fertilizer.**	CSIR-Central Mechanical Engineering Research Institute, Durgapur (West Bengal) unveiled the first-ever Waste Water Treatment Technology Model which purifies Waste Water for Irrigation/Farming purposes. **It facilitates an Organic Farming Model through treated Waste Water**.

Q.30) The PREZODE initiative aims to keep the risk of which of the following?

a) Nuclear weapons
b) Zoonotic diseases
c) Climate Change
d) Ocean pollution

Q.30) Solution (b)

- **The PREZODE**, a first-ever international initiative to prevent future pandemics is an initiative to **prevent emerging zoonotic risks and pandemics**, was announced on the occasion of the One Planet Summit 2021.
- The PREZODE initiative aims to keep the risk of emerging zoonoses and pandemics in check. It is built on and strengthens existing cooperation between the regions of the world that are most exposed to emerging zoonotic diseases.
- PREZODE is designed to incorporate and reinforce networks on human health, animal welfare and the environment. In line with the One Health concept, it aims to better

evaluate and detect emerging zoonotic threats and develop preventive measures with all players to protect humans, the planet, and socio-ecosystems. And in doing so, PREZODE reduces the threat of pandemics.

Directions for the following 3 (three) questions:

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

The success of the bold direct taxation proposals contained in the Union budget for 2004-05 will have a crucial bearing on the realisation of the targeted fiscal deficit projection for the year, according to economists and tax consultants. In particular, the amnesty scheme introduced to harness black money is being seen as vital to the government's calculations. Finance minister P Chidambaram announced in his budget presentation that he was expecting to augment direct tax revenues by 15 to 16 per cent.

This has led analysts to conclude that the attainment of the government's direct taxation target would be largely dependent on widening the tax net and would also significantly depend on the success of the amnesty scheme announced to induct black money into the mainstream economy. Most tax consultants opined that the amnesty scheme would draw an extremely favourable response. "It is a tremendous opportunity."

The finance minister said that residents of metropolitan cities who owned cars, telephones and travelled abroad would be roped into tax net. The budget has also introduced an "estimated income scheme" for retail traders with a turnover less than Rs. 40 lakh. Their income would be estimated at 5 per cent of the turnover and those claiming lower incomes would be subjected to audit. "This would also serve to rope in assesses after the earlier presumptive Rs. 1,400 scheme was a failure." Another bold and much-sought-after change introduced in the budget is the abolition of taxation of dividend in the hands of the shareholder. Instead, companies would be liable to pay 20 per cent tax on dividend distributed.

Q.31) "It is tremendous opportunity." In this sentence 'It' refers to

a) direct taxation proposals
b) widening the tax net
c) amnesty scheme
d) Budget 2004-05

Q.31) Solution (c)

Most tax consultants opined that the amnesty scheme would draw an extremely favourable response.

We can clearly infer from the 2nd last sentence of the 2nd paragraph of the passage that 'the amnesty scheme' has been mentioned as 'it' in the next sentence.

Q.32) According to the passage, the success of the bold direct taxation proposals will have a bearing upon

a) The attainment of the government's direct taxation target.
b) Not widening the tax net.
c) Decreasing direct tax revenues.
d) Realisation of the targeted fiscal deficit projection.

Q.32) Solution (d)

The success of the bold direct taxation proposals contained in the Union budget for 2004-05 will have a crucial bearing on the realisation of the targeted fiscal deficit projection for the year…

We can clearly infer from the 1st sentence of the first passage that the success of the bold direct taxation proposals will have a bearing upon the realisation of the targeted fiscal deficit projection.

Q.33) What change has been introduced in the budget for 2004-05?

a) Companies have been exempted from paying 10 percent tax on dividend.
b) Abolition of taxation of dividend to the shareholders.
c) To support corporate sector in particular
d) To impose double taxation on dividend income.

Q.33) Solution (b)

Another bold and much-sought-after change introduced in the budget is the abolition of taxation of dividend in the hands of the shareholder.

We can clearly infer from the 2nd last sentence of the last paragraph of the passage that the abolition of taxation of dividend in the hands of shareholder was a major change in the budget for 2004-05.

Q.34) In a certain code language 'HORSE' is written as 71417184, then the word 'MONKEY' is coded as:

a) 11141216425
b) 12141310424
c) 12151411325
d) 12151210424

Q.34) Solution (b)

'HORSE' is written as 71417184

In alphabetical order H comes in the 8th place, O comes in the 15th place, R comes in the 18th place, S comes 19th and E comes 5th.

We are given 71417185 i.e. 1 place is reduced from the alphabetical order of the letter.

Thus, 'MONKEY' will be coded as '12141310424'.

Hence, option b is correct.

Q.35) In a certain code language, "LOYALTY" is written as "ZUMBZPM". How is "LAUGHTER" written in that code language?

a) SFHJOMN
b) SFUIHVBM
c) SHFOJMK
d) SHFOMJL

Q.35) Solution (b)

In the given first code LOYALTY is written by increasing every letter of the word by 1 letter and writing it in reverse order. i.e. L+1 = M, O+1 = P, Y+1= Z, A+1 = B, L+1 = M, T+1 = U, Y+1 = Z ZUMBZPM

Likewise, LAUGHTER will be written as SFUIHVBM