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Q.1) What is/are the sources from where we can get information regarding the interior of the Earth?

1. Meteors
2. Gravitation
3. Magnetic field
4. Volcanic eruption

Choose the correct answer from the codes given below:

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

Q.1) Solution (d)

The earth's radius is 6,370 km. No one can reach the centre of the earth and make observations or collect samples of the material. Understanding of the earth's interior is essential to understand the nature of changes that take place over and below the earth's surface:

- To understand geophysical phenomenon like volcanism, earthquakes etc.
- To understand the internal structure of various solar system objects.
- To understand the evolution and present composition of atmosphere.
- Future deep-sea mineral exploration etc.

Sources of information about the interior:

1. Direct Sources:

- Deep earth mining and drilling reveals the nature of rocks deep down the surface.
- Volcanic eruption forms another source of obtaining direct information. As and when then molten material (magma) is thrown onto the surface of the earth, during volcanic eruption it becomes available for laboratory analysis.

2. Indirect Sources

- Meteors: Meteors and Earth are solar system objects that are born from the same nebular cloud. Thus they are likely to have a similar internal structure.
- Gravitation: The gravitation force (g) is not the same at different latitudes on the surface. It is greater near the poles and less at the equator. This is because of the distance from the centre at the equator being greater than that at the poles. The gravity values also differ according to the mass of material. The uneven distribution of mass of material within the earth influences this value. Such a difference is called gravity anomaly. Gravity anomalies give us information about the distribution of mass of the material in the crust of the earth.

- Magnetic field: The geodynamo effect helps scientists understand what's happening inside the Earth's core. Shifts in the magnetic field also provide clues to the inaccessible iron core.

Q.2) Consider the following statements regarding Earthquake Waves:

1. P waves cannot pass through liquids or gases.
2. S waves can travel in all mediums.
3. L waves are responsible for most of the destructive force of earthquake.

Which of the above statements is/are correct?

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

Q.2) Solution (c)

Earthquake Waves:

All natural earthquakes take place in the lithosphere (depth up to 200 km from the surface of the earth). The earthquake waves are measured with the help of a seismograph and are of three types—

1. 'P' waves or primary waves (longitudinal nature)
2. 'S' waves or secondary waves (transverse in nature)
3. 'L' waves or surface waves

1. Primary Waves (P waves):

- They are also called as the longitudinal or compressional waves.
- Particles of the medium vibrate along the direction of propagation of the wave.
- P-waves move faster and are the first to arrive at the surface.
- These waves are of high frequency.
- They can travel in all mediums.
- Velocity of P waves in Solids > Liquids > Gases
- Their velocity depends on shear strength or elasticity of the material.
- The shadow zone for 'P' waves is an area that corresponds to an angle between 103^{o} and 142^{o}

2. Secondary Waves (S waves)

- They are also called as transverse or distortional waves.
- Analogous to water ripples or light waves.
- S-waves arrive at the surface with some time lag.
- A secondary wave cannot pass through liquids or gases.

- These waves are of high frequency waves.
- Travel at varying velocities (proportional to shear strength) through the solid part of the Earth's crust, mantle.
- The shadow zone of 'S' waves extends almost halfway around the globe from the earthquake's focus.

3. Surface Waves (L waves)

- They are also called as long period waves.
- They are low frequency, long wavelength, and transverse vibration.
- Generally affect the surface of the Earth only and die out at smaller depth.
- Develops in the immediate neighbourhood of the epicentre.
- They cause displacement of rocks, and hence, the collapse of structures occurs.
- These waves are responsible for most the destructive force of earthquake.
- Recoded last on the seismograph.

Q.3) Consider the following statements:

1. Gutenberg discontinuity separates the crust from the mantle
2. Mohorovicic discontinuity lies between the mantle and the outer core
3. Aluminium is the most abundant metal in the earth's crust
4. Asthenosphere is the main source of magma during volcanic eruption

Which of the above statements is/are correct?

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

Q.3) Solution (c)

Gutenberg Discontinuity: It lies between the mantle and the outer core, below 2900 km from earth's surface.

Mohorovicic Discontinuity (Moho): It separates the crust from the mantle, its average depth being about 35 km.

Aluminium is the most abundant metal in the earth's crust followed by iron and calcium.

The upper portion of the mantle is called asthenosphere. It is considered to be extending up to 400 km. It is the main source of magma that finds its way to the surface during volcanic eruptions. It has a density higher than the crust's.

Q.4) Which of the following is/are the effects of the process of weathering?

1. **Formation of soil**
2. **Natural soil enrichment**
3. **Loss of arable land**

Choose the correct answer from the codes given below:

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

Q.4) Solution (b)

Weathering is defined as mechanical disintegration and chemical decomposition of rocks through the actions of various elements of weather and climate. As very little or no motion of materials takes place in weathering, it is an in-situ or on-site process.

Significance of weathering:

- Weathering is the first step in formation of soils.
- Weathering of rocks and deposits helps in the enrichment and concentrations of certain valuable ores of iron, manganese, aluminium, copper etc.
- Weathering helps in soil enrichment.
- Without weathering, the concentration of the same valuable material may not be sufficient and economically viable to exploit process and refine. This is what is called enrichment.

When weathered material is eroded by rivers or winds that leads to removal of top fertile layer of the soil. This layer is rich in the essential nutrients required by the plants and the soil. Thus loss of arable land is the effect of erosion not weathering.

Note: (Erosion is a mobile process while weathering is a static process)

Q.5) Consider the following pairs:

	(Tectonic Plates)	*(Location)*
1.	Fuji plate	North-east of Australia
2.	Cocos plate	Between South America and Pacific plate
3.	Nazca plate	Between Central America and Pacific plate

Which of the above pairs is/are correctly matched?

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

d) **1, 2 and 3**

Q.5) Solution (a)

A tectonic plate is a massive, irregularly- shaped slab of solid rock, generally composed of both continental and oceanic lithosphere.

A tectonic plate may be a continental plate or an oceanic plate, depending upon which of the two occupies the larger portion of the plate.

Earth's lithosphere is divided into seven major and some minor plates:

Major tectonic plates:

1. Antarctica and the surrounding oceanic plate
2. North American plate
3. South American plate
4. Pacific plate
5. India-Australia-New Zealand plate
6. Africa with the eastern Atlantic floor plate
7. Eurasia and the adjacent oceanic plate

Minor tectonic plates:

1. Cocos plate: Between Central America and Pacific plate
2. Nazca plate: Between South America and Pacific plate
3. Arabian plate: Mostly the Saudi Arabian landmass
4. Philippine plate: Between the Asiatic and Pacific plate
5. Caroline plate: Between the Philippine and Indian plate (North of New Guinea)
6. Fuji plate: North-east of Australia.
7. Turkish plate
8. Aegean plate (Mediterranean region),
9. Caribbean plate

There are many more minor plates other than the above mentioned plates. Most of these minor plates were formed due to stress created by converging major plates. Example: the Mediterranean Sea is divided into numerous minor plates due to the compressive force exerted by Eurasian and African plates.

Q.6) Consider the following landforms:

1. Peneplane
2. Alluvial Fans and Cones
3. Gulleys

4. Natural Levees
5. Terraces

Which of the above are Fluvial Depositional Landforms?

a) 1 and 3 only
b) 2 and 4 only
c) 3 and 5 only
d) 4 and 5 only

Q.6) Solution (b)

The landforms created as a result of degradational action (erosion) or aggradational work (deposition) of running water are called fluvial landforms. The fluvial processes may be divided into three physical phases – erosion, transportation and deposition.

Peneplane, Gulleys and Terraces are fluvial erosional landforms while Alluvial fans and cones and Natural Levees are fluvial depositional landforms.

Terraces: Stepped benches along the river course in a flood plain are called terraces. Terraces represent the level of former valley floors and remnants of former (older) flood plains.

Gulleys/Rills: Gulley is an incised water-worn channel, which is particularly common in semi-arid areas. It is formed when water from overlandflows down a slope, especially following heavy rainfall, is concentrated into rills, which merge and enlarge into a gulley. The ravines of Chambal Valley in Central India and the Chos of Hoshiarpur in Punjab are examples of gulleys.

Peneplane (Or peneplain): This refers to an undulating featureless plain punctuated with low-lying residual hills of resistant rocks. It is considered to be an end product of an erosional cycle. Peneplain, gently undulating (wave like), almost featureless plain that, in principle, would be produced by fluvial erosion that would, in the course of geologic time, reduce the land almost to baselevel (sea level), leaving so little gradient that essentially no more erosion could occur.

Alluvial Fans and Cones: When a stream leaves the mountains and comes down to the plains, its velocity decreases due to a lower gradient. As a result, it sheds a lot of material, which it had been carrying from the mountains, at the foothills. This deposited material acquires a conical shape and appears as a series of continuous fans. These are called alluvial fans. Such fans appear throughout the Himalayan foothills in the north Indian plains.

Natural Levees: These are narrow ridges of low height on both sides of a river, formed due to deposition action of the stream, appearing as natural embankments. These act as a

natural protection against floods but a breach in a levee causes sudden floods in adjoining areas, as it happens in the case of the Hwang Ho river of China.

Q.7) Landforms like Arete, Drumlin and Esker are seen in:

a) Oceans
b) Rivers
c) Glaciers
d) Deserts

Q.7) Solution (c)

Arete, Drumlin and Esker landforms are created by Glaciers.

A glacier is a moving mass of ice at speeds averaging few meters a day.

A glacier during its lifetime creates various landforms which may be classified into erosional and depositional landforms.

Arete: It is a steep-sided, sharp-tipped summit with the glacial activity cutting into it from two sides.

Esker: It is winding ridge of un-assorted depositions of rock, gravel, clay etc. running along a glacier in a till plain. The eskers resemble the features of an embankment and are often used for making roads.

Drumlin: It is an inverted boat-shaped deposition in a till plain caused by deposition.

Q.8) Consider the following characteristics:

1. Cover 75% of earth's crust but volumetrically occupy only 5%
2. Presence of fossils of plants and animals
3. Allows percolation of water

Which of the following rocks shows above characteristics?

a) Igneous rocks
b) Sedimentary rocks
c) Metamorphic rocks
d) None of the above

Q.8) Solution (b)

Sedimentary Rocks are formed as a result of denudation (weathering or erosion). These deposits through compaction turn into rocks. This process is called lithification. They Cover 75 per cent of the earth's crust but volumetrically occupy only 5 per cent. They are layered or stratified of varying thickness. Example: sandstone, shale etc.

Chief Characteristics of Sedimentary Rocks are:

- These rocks consist of a number of layers or strata
- These rocks are characterized by marks left behind by water currents and waves etc.
- These rocks have fossils of plants and animals.
- These rocks are generally porous and allow water to percolate through them.
- Spread of Sedimentary Rocks in India
- Alluvial deposits in the Indo-Gangetic plain and coastal plains are of sedimentary accumulation.
- These deposits contain loam and clay.
- Different varieties of sandstone are spread over Madhya Pradesh, eastern Rajasthan, parts of Himalayas, Andhra Pradesh, Bihar and Odisha.
- The great Vindhyan highland in central India consists of sandstones, shales, limestones.
- Coal deposits occur in river basins of the Damodar, Mahanadi, Godavari in the Gondwana sedimentary deposits.

Q.9) Consider the following statements:

1. Granite under the influence of pressure turns into Schist.
2. Sandstone under the influence of heat turns into Marble.

Which of the above statements is/are correct?

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

Q.9) Solution (d)

Metamorphism is a process by which already consolidated rocks undergo recrystallization and reorganization of materials within original rocks.

As a result of thermal metamorphism, sandstone changes into quartzite and limestone into marble.

Under high pressure, granite is converted into gneiss; clay and shale are transformed into schist.

Q.10) Which of the following rivers form Arcuate delta:

1. Ganga
2. Narmada
3. Indus

Choose the correct answer from the codes given below:

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

Q.10) Solution (c)

A delta is a tract of alluvium at the mouth of a river where it deposits more material than can be carried away. The river gets divided into distributaries which may further divide and rejoin to form a network of channels.

Arcuate or Fan-shaped delta: This type of delta results when light depositions give rise to shallow, shifting distributaries and a general fan shaped profile. Examples: Nile, Ganga, Indus.

Q.11) Which of the following mountains are tectonic in origin?

1. Fold Mountains
2. Relict Mountains
3. Block Mountains
4. Volcanic Mountains

Choose the correct answer from the codes given below:

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

Q.11) Solution (c)

Based on mode of origin the mountains are classified into:

- Tectonic or original mountains

- Relict or Residual or Circum- erosional mountains

Tectonic mountains are the product of tectonic forces. The tectonic mountains are categorised into:

- Fold mountains (the Himalayas, the Rockies, the Andes)
- Block mountains (Vosges Mountains in France, the Black Forest in Germany, Vindhya and Satpura)
- Volcanic mountains (Cascade Range in the USA, Mount Kenya, Mount Kilimanjaro, Mount Fujiyama)

Relict or residual mountains (Aravallis in India, Urals in Russia) are the remanants of old fold mountains derived as a result of denudation. Residual mountains may also evolve from plateaus which have been dissected by rivers into hills and valleys.

Q.12) Consider the following statements:

1. The differences in internal forces operating from within the earth are responsible for uneven surface of the Earth.
2. The exogenic forces are mainly land building forces and the endogenic processes are mainly land wearing force.

Which of the above statements is/are correct?

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

Q.12) Solution (a)

The earth's crust is dynamic. It moves vertically and horizontally. The differences in the internal forces operating from within the earth which built up the crust have been responsible for the variations in the outer surface of the crust.

The earth's surface is being continuously subjected to by external forces originating within the earth's atmosphere and by internal forces from within the earth. The external forces are known as *exogenic forces* and the internal forces are known as *endogenic forces.* The actions of exogenic forces result in wearing down (degradation) of relief/elevations and filling up (aggradation) of basins/depressions, on the earth's surface. The endogenic forces continuously elevate or build up parts of the earth's surface and hence the exogenic processes fail to even out the relief variations of the surface of the earth. So, variations remain as long as the opposing actions of exogenic and endogenic forces continue. In general terms, the endogenic forces are mainly land building forces and the exogenic processes are mainly land wearing forces.

Q.13) Consider the following statements:

1. Primordial heat from the origin of the earth is responsible for the exogenic geomorphic processes.
2. Diastrophism is a process which leads to the formation of ocean basins and continents.

Which of the above statements is/are correct?

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

Q.13) Solution (b)

The energy emanating from within the earth is the main force behind endogenic geomorphic processes. This energy is mostly generated by radioactivity, rotational and tidal friction and primordial heat from the origin of the earth.

All processes that move, elevate or build up portions of the earth's crust come under diastrophism. Diastrophism, also called tectonism, large- scale deformation of Earth's crust by natural processes, which leads to the formation of continents and ocean basins, mountain systems, plateaus, rift valleys and other features by mechanism such as lithospheric plate movement (that is, plate tectonics), volcanic loading, or folding.

Q.14) Consider the following statements:

1. All exogenic geomorphic processes derive their ultimate energy from the sun.
2. The process of denudation does not depend upon physical condition of the rocks.

Which of the above statements is/are correct?

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

Q.14) Solution (a)

The exogenic processes derive their energy from atmosphere determined by the ultimate energy from the sun and also the gradients created by tectonic factors.

Denudation depends on physical (fold, faults, orientation and inclination of beds, presence or absence of joints, bedding planes, hardness or softness of constituent minerals, permeability) and chemical (chemical susceptibility of mineral constituents to corrosion) properties of rocks.

Q.15) Which of the following is/are the result of weathering:

1. Changes in landforms
2. Biodiversity
3. Enrichment and concentration of ores

Choose the correct answer from the codes given below:

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

Q.15) Solution (d)

Weathering processes are responsible for breaking down the rocks into smaller fragments and preparing the way for formation of not only regolith and soils, but also erosion and mass movements. Biomes and biodiversity is basically a result of forests (vegetation) and forests depend upon the depth of weathering mantles. Erosion cannot be significant if the rocks are not weathered. That means, weathering aids mass wasting, erosion and reduction of relief and changes in landforms are a consequence of erosion. Weathering of rocks and deposits helps in the enrichment and concentrations of certain valuable ores of iron, manganese, aluminium, copper etc., which are of great importance for the national economy.

Q.16) With reference to intrusive Volcanic landforms, what are Batholiths:

a) These are solidified horizontal lava layers inside the earth.
b) These are large dome-shaped intrusive bodies connected by a pipe-like conduit from below.
c) These are large rock masses formed due to cooling down and solidification of hot magma inside the earth.
d) None of the above

Q.16) Solution (c)

Intrusive landforms are formed when magma cools within the crust. Batholiths are large rock masses formed due to cooling down and solidification of hot magma inside the earth. They appear on the surface only after the denudation processes remove the overlying materials. Batholiths form the core of huge mountains and may be exposed on surface after erosion. These are granitic bodies.

Q.17) Consider the following:

1. Quartzite
2. Granite
3. Basalt
4. Siltstone
5. Diorite

Which of the above are examples of Igneous rocks?

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

Q.17) Solution (d)

Igneous rock is one of the three main rock types. Igneous rock is formed through the cooling and solidification of magma or lava. They may form with or without crystallization, either below the surface as intrusive rocks or on the surface as extrusive rocks. Examples of igneous rocks are: Diorite, granite, Basalt, Tuff, and Pumice.

Quartzite is a metamorphic rock while Siltstone is a sedimentary rock.

Q.18) Consider the following:

1. Crust
2. Upper Mantle
3. Lower Mantle
4. Core

Which of the above describes the lithosphere?

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

Q.18) Solution (a)

Lithosphere is the rigid, rocky outer layer of the earth, consisting of the crust and the solid outermost layer of the upper mantle. It extends to a depth of about 100 km. It is broken into about a dozen separate, rigid blocks or plates.

Q.19) Consider the following statements regarding Convergent Boundary interactions:

1. They are constructive in nature.
2. They are responsible for sea floor spreading and rift valleys.

Which of the above statements is/are correct?

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

Q.19) Solution (d)

A convergent plate boundary is formed when tectonic plates crash into each other. They are also known as destructive boundaries.

These boundaries are often subduction zones, where the heavier plate slips under the lighter plate, creating a deep trench.

Other than Subduction Zones, convergent plate boundaries also lead to mountain building and the formation of island arcs (Festoons).

If both the convergent plates are oceanic, the volcanoes form a curved line of islands, known as an island arc, which is parallel to the trench.

Divergent Boundaries are responsible for sea floor spreading and rift valleys.

Q.20) Consider the following statements:

1. Physical and chemical weathering processes are independent of each other.
2. Weathering is the initial stage in the formation of soil.

Which of the above statements is/are correct?

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

Q.20) Solution (b)

Physical and chemical weathering processes are not independent of each other. They are different but still interdependent. Physical or mechanical weathering processes depend on some applied forces. The applied forces could be:

- Gravitational forces such as overburden pressure, load and shearing stress
- Expansion forces due to temperature changes, crystal growth or animal activity..
- Water pressures controlled by wetting and drying cycles.

Chemical weathering depends on a group of weathering processes viz, solution,carbonation, hydration, oxidation and reduction act on the rocks to decompose, dissolve or reduce them to a fine clastic state through chemical reactions by oxygen, surface and/or soil water and other acids. Water and air (oxygen and carbon dioxide) along with heat must be present to

speed up all chemical reactions. Over and above the carbon dioxide present in the air, decomposition of plants and animals increases the quantity of carbon dioxide underground. These chemical reactions on various minerals are very much similar to the chemical reactions in a laboratory. These forces are interdependent. For example availability of water and heat depends on physical factors while chemical reactions depend on availability of water and heat.

Weathering is the initial stage in the formation of soil. Weathering is the name given to the process by which rocks are broken down to form soils. Rocks and geological sediments are the main parent material soils. It is from the rocks and sediments that soils inherit their particular texture.

Q.21) Consider the following statements:

1. Longitude helps in determining the intensity of sunlight received at a point
2. All longitudes are equal in length
3. Places to the east of Greenwich meridian gain time while those to the west lose time.

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.21) Solution (c)

The Latitudes help in determining the intensity of sunlight received at a point. They divide earth into torrid, temperate and frigid zones.

All longitudes are equal in length because each line of longitude equals half of the circumference of the Earth because each extends from the North Pole to the South Pole.

The earth rotates from west to east, so every 15° we go eastwards, local time is advanced by 1 hour. Conversely, if we go westwards, local time is retarded by 1 hour. We may thus conclude that places east of Greenwich see the sun earlier and gain time, whereas places west of Greenwich see the sun later and lose time.

Q.22) Consider the following statements:

1. Days always appear longer than nights at the equator due to refraction of rays of the Sun.
2. There is fall in temperature as we move from equator towards poles because of Geoid shape of the Earth and position of the Sun.

Which of the above statements is/ate correct?

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

Q.22) Solution (c)

1. Why days always appear longer than nights at the equator?

If there was no atmosphere, there would be no refraction and the daytime and night time would be near equal at the equator, at least during equinoxes.

But due to atmosphere, the sun's rays gets refracted (bending of light). Refraction is particularly stronger during the morning and the evening time when the sun's rays are slant.

Even though the actual sun is below the horizon, its apparent image would appear above the horizon due to refraction. This makes the days longer than nights at the equator.

2. Why there is fall in temperature with increasing latitude?

Because of the spherical (Geoid) shape of the earth and the position of the sun, the energy received per unit area decreases from equator to poles. Also Equator receives direct sunlight while Poles receive slant or oblique rays of the Sun.

Q.23) Consider the following statements regarding layers of Atmosphere:

1. All weather related phenomenon occurs in the stratosphere.
2. Stratopause separates Stratosphere and Troposphere.
3. Meteors burn in Mesosphere on entering from space.
4. Radio waves that are transmitted from the earth are reflected by Thermosphere.

Which of the above statements is/are correct?

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

Q.23) Solution (c)

Stratosphere:

- It is the second layer of the atmosphere found above the troposphere.
- It extends up to 50 km of height.
- This layer is very dry as it contains little water vapour.
- This layer provides some advantages for flight because it is above stormy weather and has steady, strong, horizontal winds.

- The ozone layer is found in this layer.
- The ozone layer absorbs UV rays and safeguards earth from harmful radiation.
- Stratopause separates Stratosphere and Mesosphere.

Mesosphere:

- The Mesosphere is found above the stratosphere.
- It is the coldest of the atmospheric layers.
- The mesosphere starts at 50 km above the surface of Earth and goes up to 85 km.
- The temperature drops with altitude in this layer.
- By 80 km it reaches -100 degrees Celsius.
- Meteors burn up in this layer.
- The upper limit is called Mesopause which separates Mesosphere and Thermosphere.

Thermosphere:

- This layer is found above Mesopause from 80 to 400 km.
- Radio waves that are transmitted from the earth are reflected by this layer.
- The temperature increases with height.
- Aurora and satellites occur in this layer.

Q.24) Consider the following statements:

1. Narrow spacing between isotherms indicates small or slow change in temperature of a given area.
2. Isotherms are more or less parallel to the latitudes in the Southern Hemisphere.

Which of the above statements is/are correct?

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

Q.24) Solution (b)

Isotherm is an imaginary line joining places having equal temperatures.

The horizontal or latitudinal distribution of temperature is shown with the help of a map with isotherms.

Effects of altitude are not considered while drawing an isotherm. All the temperatures are reduced to sea levels.

Narrow spacing between isotherms indicates rapid change in temperature (high thermal gradient).

Wide spacing between isotherms indicates small or slow change in temperatures (low thermal gradient).

The effect of the ocean is well pronounced in the southern hemisphere. Here the isotherms are more or less parallel to the latitudes and the variation in temperature is more gradual than in the northern hemisphere.

Q.25) Which of the following are the factors which affect the temperature distribution on Earth?

1. Latitudinal heat balance
2. Transparency of atmosphere
3. Land-Sea differential

Choose the correct answer from the codes given below:

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

Q.25) Solution (d)

The amount of insolation received is directly related to latitudes. In the tropical region the amount of insolation is higher than the amount of terrestrial radiation. Hence it is a region of surplus heat. In the Polar Regions the heat gain is less than the heat loss. Hence it is a region of deficit heat. Thus the insolation creates an imbalance of heat at different latitudes. This is commonly known as latitudinal heat balance.

Transparency of the atmosphere: Transparency of the atmosphere determines the amount of insolation reaching the earth's surface. The transparency depends upon cloud cover, its thickness, dust particles and water vapour, as they reflect, absorb or transmit insolation. Thick clouds hinder the insolation to reach the earth while clear sky helps it to reach the surface. Water vapour absorbs insolation, resulting in less amount of insolation reaching the surface.

Land and sea differential or contrast affects temperature to a great extent. Land gets heated more rapidly and to a greater degree than water during sunshine. It also cools down more rapidly than water during night. Hence, temperature is relatively higher on land during day time and it is higher in water during night. In the same way there are seasonal contrasts in temperature. During summer the air above land has higher temperature than the oceans. But the air above oceans gets higher temperature than landmasses in winter.

Q.26) Which of the following are the favourable conditions for temperature inversion?

1. Long winter sky
2. Cloudy sky
3. Rapid movement of air
4. Snow covered ground surface

Choose the correct answer from the codes given below:

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

Q.26) Solution: (d)

Temperature inversion: Temperature inversion is a reversal of the normal behaviour of temperature in the troposphere, in which a layer of cool air at the surface is overlain by a layer of warmer air.

Favourable Conditions for Temperature Inversion are:

- Long winter nights: Loss of heat by terrestrial radiation from the ground surface during night may exceed the amount of incoming solar radiation.
- Cloudless and clear sky: Loss of heat through terrestrial radiation proceeds more rapidly without any obstruction.
- Dry air near the ground surface: It limits the absorption of the radiated heat from the Earth's surface.
- Slow movement of air: It results in no transfer or mixing of heat in the lower layers of the atmosphere.
- Snow covered ground surface: It results in maximum loss of heat through reflection of incoming solar radiation.

Q.27) Consider the following statements regarding general circulation of the atmosphere:

1. The winds in the upper atmosphere are controlled by the pressure gradient and the Coriolis force.
2. Hadley Cell forms the circulation of winds between sinking cold air from the poles and the rising warm air from the subtropical high pressure belt.
3. Farrel cell forms between 0^0 to 30^0 North and South of the Equator.

Which of the above statements is/are correct?

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

Q.27) Solution (a)

The velocity and direction of the wind are the net result of the wind generating forces.

The winds in the upper atmosphere, 2 – 3 km above the surface, are free from frictional effect of the surface and are controlled by the pressure gradient and the Coriolis force.

Hadley cell: The cell is located between 10- 30-degree latitude in both the hemisphere. This is a thermally induced cell and is the result of intense solar insolation. The intense insolation produces rising air along the equator. The rising air cools down below tropopause and diverges towards the pole as anti-trade. They lead to upper air pilation around 30 degrees latitude and sink causing the sub-tropical high pressure. The trade wind flows from this HP toward the equator and completes this cell. It is one of the most permanent cells and is associated with Tropical monsoon climate and tropical desert.

Ferrell Cell: In the middle latitudes the circulation is that of sinking cold air that comes from the poles and the rising warm air that blows from the subtropical high. At the surface these winds are called westerlies and the cell is known as the Ferrel cell.

Q.28) Consider the following statements regarding Jet Streams:

1. Air north of a jet stream is typically colder, while air to the south is usually warmer.
2. Jet streams travel in the Stratosphere.
3. Slower, weaker jet streams have been linked to melting of ice in Greenland.

Which of the above statements is/are correct?

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

Q.28) Solution (b)

Jet streams are fast-moving currents of air that circulate above the Earth. When people refer to "the jet stream" they are usually referring to the polar-front jet stream or the subtropical jet stream, two major jet streams that shape weather patterns around the world.

Jet streams travel in the tropopause—the area between the troposphere and the stratosphere—at heights of about 8 to 15 kilometers.

Jet streams are stronger in winter in the northern and southern hemispheres, because that's when air temperature differences that drive them tend to be most pronounced.

The polar-front jet stream forms at about 60 degrees latitude in both hemispheres, while the subtropical jet stream forms at about 30 degrees.

Air north of a jet stream is typically colder, while air to the south is usually warmer. As jet streams dip or break off, they move air masses around, creating shifts in global weather patterns.

Rising global temperatures from global warming are affecting the jet stream and, in turn, the weather. Because the Earth's polar regions are warming more quickly than the rest of the world, the temperature contrast that drives jet streams has decreased. Slower, weaker jet streams have been linked to melting in Greenland and a potential rise in deadly weather events because they can lock weather systems into place, stalling them over regions.

Q.29) Consider the following statements:

1. Water Vapour plays a crucial role in the Earth's heat budget.
2. The amount of water vapour present decides the quantity of latent energy stored up in the atmosphere for development of storms and cyclones.

Which of the above statements is/are correct?

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

Q.29) Solution (c)

Water vapour in air varies from zero to four per cent by volume of the atmosphere (averaging around 2% in the atmosphere). Amount of water vapour (Humidity) is measured by, an instrument called Hygrometer.

- Water vapour absorbs radiation—both incoming and terrestrial. It thus plays a crucial role in the earth's heat budget.
- The amount of water vapour present decides the quantity of latent energy stored up in the atmosphere for development of storms and cyclones.
- The atmospheric moisture affects the human body's rate of cooling by influencing the sensible temperature.

Q.30) Consider the following statements:

1. Dew point occurs when Relative Humidity is 100%.
2. Relative humidity is greater over the continents and least over the oceans.
3. Specific humidity does not depend upon changes in pressure or temperature.

Choose the correct answer from the codes given below:

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

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

Q.30) Solution (b)

Dew Point: The air containing moisture to its full capacity at a given temperature is said to be saturated. It means that the air at the given temperature is incapable of holding any additional amount of moisture at that stage.

The temperature at which saturation occurs in a given sample of air is known as dew point. Dew point occurs when Relative Humidity is 100%.

Relative Humidity: The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as the relative humidity.

Relative humidity is greater over the oceans and least over the continents. It determines the amount and rate of evaporation and hence it is an important climatic factor.

Air containing moisture to its full capacity at a given temperature is said to be 'saturated'. At this temperature, the air cannot hold any additional amount of moisture. Thus, relative humidity of the saturated air is 100%.

Specific Humidity: It is expressed as the weight of water vapour per unit weight of air. Since it is measured in units of weight (usually grams per kilogram), the specific humidity is not affected by changes in pressure or temperature.

Q.31) Consider the following statements:

1. Clouds are caused mainly by the adiabatic cooling of air below its dew point.
2. Cirrus clouds are formed at a height of 4,000 - 7,000 m and have a flat base.
3. Cumulus clouds are defined as high clouds.

Which of the above statements is/are correct?

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

Q.31) Solution (a)

Cloud is a mass of minute water droplets or tiny crystals of ice formed by the condensation of the water vapour in free air at considerable elevations.

Clouds are caused mainly by the adiabatic cooling of air below its dew point.

As the clouds are formed at some height over the surface of the earth, they take various shapes.

According to their height, expanse, density and transparency or opaqueness clouds are grouped under four types: (i) cirrus; (ii) cumulus; (iii) stratus; (iv) nimbus.

Cirrus clouds are formed at high altitudes (8,000 – 12,000m). They are thin and detached clouds having a feathery appearance. They are always white in colour.

Cumulus clouds look like cotton wool. They are generally formed at a height of 4,000 -7,000 m. They exist in patches and can be seen scattered here and there. They have a flat base.

Cumulus Clouds are low clouds while Cirrus clouds are high clouds.

Q.32) Consider the following statements regarding Polar Vortex:

1. It is an area of high pressure arctic air centred around North Pole.
2. This phenomenon cannot be observed visibly like tornadoes and funnel clouds.
3. Global warming weakens the polar vortex which is responsible for severe cold in North America and Europe.

Which of the above statements is/are correct?

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

Q.32) Solution (c)

The polar vortex is a large area of low pressure and cold air surrounding both of the Earth's poles. It always exists near the poles, but weakens in summer and strengthens in winter.

Polar Vortex is not something that will be visibly observed like tornadoes; funnel clouds, thunderstorm, lightening etc.

Features:

- The polar vortex spins in the stratosphere.
- Usually, when the vortex is strongest, cold air is less-likely to plunge deep into North America or Europe. In other words, it forms a wall that protects the mid-latitudes from cold Arctic air.
- But occasionally, the polar vortex is disrupted and weakens, due to wave energy propagating upward from the lower atmosphere. When this happens, the stratosphere warms sharply in an event known as sudden stratospheric warming, in just a few days, miles above the Earth's surface.
- The warming weakens the polar vortex, shifting its location somewhat south of the pole or, in some instances, 'splitting' the vortex up into 'sister vortices'.

A sudden stratospheric warming also leads to a warm Arctic not only in the stratosphere but also in the troposphere as well. A warmer Arctic, in turn, favours more severe winter weather in the Northern Hemisphere middle latitudes including the eastern US.

Q.33) According to the India Meteorological Department the heat wave is considered when the maximum temperature of an area reaches at least 40°C for Plains and at least 30°C for Hilly regions. In this respect, consider the following statements:

1. If the normal maximum temperature of an area is less than or equal to 40°C, then an increase of 5°C to 6°C from the normal temperature is considered as severe heat wave condition.
2. Urban heat island effect is the reason India is experiencing more heat waves.

Which of the above statements is/are correct?

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

Q.33) Solution (b)

A Heat Wave is a period of abnormally high temperatures, more than the normal maximum temperature that occurs during the summer season. Heat Waves typically occur between March and June, and in some rare cases even extend till July.

Criteria for Heat Waves:

The Indian Meteorological Department (IMD) has given the following criteria for Heat Waves:

- Heat Wave need not be considered till the maximum temperature of a station reaches at least 40°C for Plains and at least 30°C for Hilly regions.
- When the normal maximum temperature of a station is less than or equal to 40°C, Heat Wave Departure from normal is 5°C to 6°C and Severe Heat Wave Departure from normal is 7°C or more.
- When the normal maximum temperature of a station is more than 40°C, Heat Wave Departure from normal is 4°C to 5°C and Severe Heat Wave Departure from normal is 6°C or more.
- When the actual maximum temperature remains 45°C or more irrespective of normal maximum temperature, heat waves should be declared.

Magnified effect of paved and concrete surfaces in urban areas and a lack of tree cover known as urban heat island effects can make ambient temperatures feel 3 to 4 degrees more than what they are is the cause of heat waves in India.

Q.34) Consider the following statements with respect to photochemical smog:

1. It is formed due to high concentration of Sulphur Dioxide and Particulate matters in the atmosphere.
2. It is formed in mid-day of summer.
3. Ground level ozone is the byproduct of this smog.

Which of the above statements is/are correct?

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

Q.34) Solution (b)

Smog is the term derived from two words smoke and fog. It is a kind of intense air pollution. Smog is the result of the reaction of emissions from automobiles, factories, and industries with the sunlight and atmosphere.

The causes behind the formation of the smogs are different. Hence they are classified into 2 different types.

- Photochemical Smog (Also called Los Angeles Smog)
- Sulfurous smog (Also called London Smog)

Photochemical smog:

- Photochemical smog is created when sunlight reacts with nitrogen oxides and at least one volatile organic compound (VOC) in the atmosphere. This kind of smog requires neither smoke nor fog.
- Photochemical smog is formed during the month of summer during afternoon when there is bright sunlight so that photochemical reaction can take place.
- Ground level ozone is the byproduct of this smog. Ground-level ozone is not emitted directly into the atmosphere. It results from photochemical reactions between oxides of nitrogen (NOx) and volatile organic compounds (VOCs) in the presence of sunlight.

Sulfurous smog:

- Sulfurous smog is the result of a high concentration of sulfur oxides in the atmosphere. This is usually caused by the burning of fossil fuels like coal.
- Sulfurous smog is also called "London smog," (first formed in London).

Q.35) Which of the following is/are the reasons for more number of Tropical Cyclones in the Bay of Bengal compared to that of Arabian Sea?

1. Warmer Arabian Sea

2. Trough like shape of Bay of Bengal
3. Lack of landmass between the Pacific Ocean and the Bay of Bengal

Choose the correct answer from the codes given below:

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

Q.35) Solution (b)

A tropical cyclone is a rapidly rotating storm system characterized by a low-pressure center, a closed low-level atmospheric circulation, strong winds, and a spiral arrangement of thunderstorms that produce heavy rain and/or squalls.

Cyclones in the Bay of Bengal can be attributed to the vast low pressure created by the warm water of the ocean. The Bay of Bengal gets more rainfall with sluggish winds and warm air currents around it that keeps temperatures relatively high all year. The constant inflow of fresh warm water from the perineal rivers like Bramhaputra, Ganga makes it further impossible to mix with the cooler water below.

As for the Arabian Sea, it is much calm as the stronger winds help dissipate the heat and lack of constant fresh water helps the warm water to mix with the cool water underneath, reducing the surface temperature.

The Bay of Bengal shaped like a trough that makes it more hospitable for storms to gain force.

Lack of landmass between the Pacific Ocean and the Bay of Bengal tend cyclonic winds to move into the coastal areas causing heavy rainfall. The Arabian Sea enjoys the locational advantage as the winds from the Pacific Ocean encounter the Western Ghats and the Himalayas cutting down on its intensity and sometimes never reaching the Arabian Sea.

Q.36) Consider the following statements regarding Tropical Cyclones:

1. Presence of the Coriolis force with large variation in the vertical wind speed is required for the formation of tropical cyclones.
2. They are absent in the equatorial zone between 4° S and 4° N.

Which of the above statements is/are correct?

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

Q.36) Solution (b)

Tropical cyclones are violent storms that originate over oceans in tropical areas and move over to the coastal areas bringing about large scale destruction caused by violent winds, very heavy rainfall and storm surges.

Tropical cyclones originate and intensify over warm tropical oceans. The conditions favourable for the formation and intensification of tropical storms are:

- Large sea surface with temperature higher than 27° C.
- Presence of the Coriolis force.
- Small variations in the vertical wind speed.
- A pre-existing weak low- pressure area or low-level-cyclonic circulation.
- Upper divergence above the sea level system.

They originate in two distinct latitude zones, between 4° and 22° S and between 4° and 35° N. They are absent in the equatorial zone between 4° S and 4° N because of absence of coriolis force.

Q.37) The type of precipitation when warm, humid air strikes a mountain range resulting in greater rainfall in the windward slope of the mountain range is known as:

a) Conventional Rainfall
b) Frontal Rainfall
c) Monsoonal Rainfall
d) Orographic Rainfall

Q.37) Solution (d)

Orographic Rainfall:

When the saturated air mass comes across a mountain, it is forced to ascend and as it rises, it expands (because of fall in pressure); the temperature falls, and the moisture is condensed.

This type of precipitation occurs when warm, humid air strikes an orographic barrier (a mountain range) head on. Because of the initial momentum, the air is forced to rise. As the moisture laden air gains height, condensation sets in, and soon saturation is reached. The surplus moisture falls down as orographic precipitation along the windward slopes.

The chief characteristic of this sort of rain is that the windward slopes receive greater rainfall. After giving rain on the windward side, when these winds reach the other slope, they descend, and their temperature rises. Then their capacity to take in moisture increases and hence, these leeward slopes remain rainless and dry.

The area situated on the leeward side, which gets less rainfall is known as the rain-shadow area (Some arid and semi-arid regions are a direct consequence of rain-shadow effect.

Example: Mahabaleshwar, situated on the Western Ghats, receives more than 600 cm of rainfall, whereas Pune, lying in the rain shadow area, has only about 70 cm.

Q.38) Consider the following statements:

a) Temperate cyclones are more pronounced in the southern hemisphere.
b) Tropical cyclones are frontal in origin.
c) Temperate cyclones can form both on land as well as seas
d) In a temperate cyclone, rainfall is slow and continues for many days.

Which of the above statements is/are correct?

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

Q.38) Solution (c)

Temperate cyclone are Confined to 35^0 – 65^0 N and S of equator. More pronounced in Northern hemisphere due to greater temperature contrast.

They have a dynamic origin and cyclone formation is due to frontogenesis (interaction of cold and warm fronts). When the warm-humid air masses from the tropics meet the dry-cold air masses from the poles and thus a polar front is formed as a surface of discontinuity. The cold air pushes the warm air upwards from underneath. Thus, a void is created because of lessening of pressure. The surrounding air rushed in to occupy this void and coupled with the earth's rotation, a temperate cyclone is formed.

Temperate cyclones can origin on both landmass and water while tropical cyclones form only on seas with temperature more than 26-270 C. They dissipate on reaching the land.

In a temperate cyclone, associated weather conditions are mild and overcast sky in initial stage and followed by moderate to heavy rain for long period of time on large area. So, here less destruction is due to winds but more destruction is due to flooding.

Q.39) Consider the following statements:

1. The Walker circulation is caused as a result from a high pressure system over Indonesia and a low pressure system over eastern Pacific Ocean.
2. El Nino conditions in Pacific Ocean leads to drought in Indonesia and Australia and it has devastating effect on marine life off the coast of Peru and Ecuador.

Which of the above statements is/are correct?

a) 1 only

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

Q.39) Solution (b)

The Walker circulation (walker cell) is caused by the pressure gradient force that results from a high pressure system over the eastern Pacific Ocean, and a low pressure system over Indonesia. The Walker cell is indirectly related to upwelling off the coasts of Peru and Ecuador. This brings nutrient-rich cold water to the surface, increasing fishing stocks.

In an El Niño year, air pressure drops over large areas of the central Pacific and along the coast of South America.

The normal low pressure system is replaced by a weak high in the western Pacific (the southern oscillation). These changes in pressure pattern cause the trade winds to be reduced. This weakens the walker cell sometimes Walker Cell might even get reversed.

This reduction allows the equatorial counter current (current along doldrums) to accumulate warm ocean water along the coastlines of Peru and Ecuador. This accumulation of warm water causes the thermocline to drop in the eastern part of Pacific Ocean which cuts off the upwelling of cold deep ocean water along the coast of Peru.

Climatically, the development of an El Niño brings drought to the western Pacific, rains to the equatorial coast of South America, and convective storms and hurricanes to the central Pacific. Severe droughts occur in Australia, Indonesia, India and southern Africa.

Q.40) Consider the following statements regarding Indian Ocean Dipole:

1. IOD is the difference in atmospheric pressure above Indian Ocean.
2. Positive IOD results in more cyclones than usual in the Bay of Bengal.

Which of the above statements is/are correct?

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

Q.40) Solution (d)

The Indian Ocean Dipole (IOD) is defined by the difference in sea surface temperature between two areas (or poles, hence a dipole) – a western pole in the Arabian Sea (western Indian Ocean) and an eastern pole in the eastern Indian Ocean south of Indonesia.

IOD develops in the equatorial region of Indian Ocean from April to May peaking in October.

With a positive IOD winds over the Indian Ocean blow from east to west (from Bay of Bengal towards Arabian Sea). This result in the Arabian Sea (western Indian Ocean near African Coast) being much warmer and eastern Indian Ocean around Indonesia becoming colder and dry.

In the negative dipole year (negative IOD), reverse happens making Indonesia much warmer and rainier.

Positive IOD (Arabian Sea warmer than Bay of Bengal) results in more cyclones than usual in Arabian Sea.

Negative IOD results in stronger than usual cyclonogenesis (Formation of Tropical Cyclones) in Bay of Bengal. Cyclonogenesis in Arabian Sea is suppressed.

Q.41) With reference to continental shelf, consider the following statements:

1. Most commercial exploitation from the sea takes place on the continental shelf.
2. Continental shelves are the richest fishing grounds in the world.
3. United Nations Convention on the Law of the Sea limits the exploitation of resources from continental shelf of the concerned coastal states up to 12 nautical miles from the coast.

Which of the above statements is/are correct?

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

Q.41) Solution (a)

A continental shelf is the edge of a continent that lies under the ocean. Continents are the seven main divisions of land on Earth. A continental shelf extends from the coastline of a continent to a drop-off point called the shelf break. From the break, the shelf descends toward the deep ocean floor in what is called the continental slope.

Most commercial exploitation from the sea, such as metallic-ore, non-metallic ore, and hydrocarbon extraction, takes place on the continental shelf.

Their shallowness enables sunlight to pene-trate through the water, which encourages the growth of minute plants and other microscopic organisms. They are thus rich in plankton on which millions of surface and bottom-feeding fishes thrive. The con-tinental shelves are therefore the richest fishing grounds in the world, e.g. the Grand Banks off Newfoundland, the North Sea and the Sunda Shelf.

Their limited depth and gentle slope keep out cold under-currents and increase the height of tides. This sometimes hinders shipping and other marine activities since ships can only

enter and leave port on the tide. Most of the world's greatest seaports including Southampton, London, Hamburg, Rotterdam, Hong Kong and Singapore are located on continental shelves.

United Nations Convention on the Law of the Sea (UNCLOS) limits the exploitation of resources from continental shelf of the concerned coastal states up to 200 nautical miles from the coast. It is known as Exclusive Economic Zone.

In the exclusive economic zone, the coastal State has sovereign rights for the purpose of exploring and exploiting, conserving and managing the natural resources, whether living or non-living and with regard to other activities for the economic exploitation and exploration of the zone, such as the production of energy from the water, currents and winds.

Q.42) What is/are the significance of the study of oceanic morphology?

1. Ocean relief controls the nature, character and the motion of sea water.
2. Oceanic movements in the form of currents are responsible for variations in character of flora and fauna in the ocean.
3. Bottom relief of ocean influences navigation and fishing.

Choose the correct answer from the codes given below:

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

Q.42) Solution (d)

The study of the morphology of the oceans is important because the relief controls the nature, character and the motion of sea water.

The oceanic movement in the form of currents, in turn, causes many variations, which are important to the character of marine fauna and flora.

The bottom relief of oceans also influences navigation, fishing and other important activities of man.

Q.43) Consider the following statements:

1. A bay is a large body of water, sometimes with a narrow mouth, that is almost completely surrounded by land.
2. A gulf is a small body of water that is set off from a larger body of water generally where the land curves inward.
3. A strait is a narrow passageway of water, usually between continents or islands, or between two larger bodies of water.

Which of the above statements is/are correct?

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

Q.43) Solution (c)

A bay is a small body of water or a broad inlet that is set off from a larger body of water generally where the land curves inward. Bays usually occur on oceans, lakes, and gulfs, and generally not on rivers except when there is an artificially enlarged river mouth.

A gulf is a large body of water, sometimes with a narrow mouth, that is almost completely surrounded by land. It can be considered a large bay. The world's largest gulf is the Gulf of Mexico. The Persian Gulf is important with respect to world energy because petroleum is transported through its waters in oil tankers.

A strait is a narrow passageway of water, usually between continents or islands, or between two larger bodies of water. The Strait of Gibraltar is probably the world's most famous strait. It connects the Atlantic Ocean on its west with the Mediterranean Sea on its east. It also separates northern Africa from the Rock of Gibraltar on the southernmost point of the Iberian Peninsula.

Q.44) With reference to oceanic and fresh water ecosystem, consider the following statements regarding "Hypoxia"?

1. It refers to excessive supply of oxygen in a water body.
2. It often leads to formation of dead zones in the oceans.
3. Hypoxia in water bodies occurs most often, as a consequence of human-induced factors

Which of the above statements is/are correct?

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

Q.44) Solution (d)

In ocean and freshwater environments, the term "hypoxia" refers to low or depleted oxygen in a water body. Hypoxia is often associated with the overgrowth of certain species of algae, which can lead to oxygen depletion when they die, sink to the bottom, and decompose.

In some cases, vast stretches of open water become hypoxic. Unable to sustain life, these areas, called dead zones, may cause die-offs of fish, shellfish, corals, and aquatic plants.

The amount of oxygen in any water body varies naturally, both seasonally and over time. This occurs due to a balance between oxygen input from the atmosphere and certain biological and chemical processes, some of which produce oxygen while others consume it.

Stratification in the water column, which occurs when less dense freshwater from an estuary mixes with heavier seawater, is one natural cause of hypoxia. Limited vertical mixing between the water "layers" restricts the supply of oxygen from surface waters to more saline bottom waters, leading to hypoxic conditions in bottom habitats.

Hypoxia occurs most often, however, as a consequence of human-induced factors, especially nutrient pollution (also known as eutrophication). The causes of nutrient pollution, specifically of nitrogen and phosphorus nutrients, include agricultural runoff, fossil-fuel burning, and wastewater treatment effluent.

Q.45) Which of the following statements is/are correct regarding Black Sea:

1. It is a marginal sea of Pacific Ocean
2. It is connected to Sea of Azov and Sea of Marmara.
3. It is the largest water body with meromictic basin

Choose the correct answer from the codes given below:

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

Q.45) Solution (b)

The Black Sea is a marginal sea of the Atlantic Ocean lying between Europe and Asia.

The Black Sea is bordered by Bulgaria, Georgia, Romania, Russia, Turkey, and Ukraine.

The Black Sea ultimately drains into the Mediterranean Sea, via the Turkish Straits and the Aegean Sea. The Bosporus Strait connects it to the small Sea of Marmara which in turn is connected to the Aegean Sea via the Strait of the Dardanelles. To the north, the Black Sea is connected to the Sea of Azov by the Kerch Strait.

The Black Sea is the world's largest body of water with a meromictic basin which means layers of water that do not intermix.

Denser, more saline water from the Aegean flows into the Black Sea underneath the less dense, fresher outflowing water from the Black Sea. This creates a significant and permanent layer of deep water that does not drain or mix and is therefore anoxic. This anoxic layer is responsible for the preservation of ancient shipwrecks which have been found in the Black Sea.

Q.46) With reference to ocean currents consider the following statements?

1. Ocean current is usually strongest at the bottom of the ocean and decreases in strength at the surface.
2. Temperature difference and salinity difference are the primary force that influences the ocean currents.

Which of the above statements is/are correct?

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

Q.46) Solution (d)

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

Currents are referred to by their "drift". Usually, the currents are strongest near the surface and may attain speeds over five knots. At depths, currents are generally slow with speeds less than 0.5 knots. We refer to the speed of a current as its "drift." Drift is measured in terms of knots. The strength of a current refers to the speed of the current. A fast current is considered strong. A current is usually strongest at the surface and decreases in strength (speed) with depth. Most currents have speeds less than or equal to 5 knots.

Ocean currents are influenced by two types of forces namely:

- Primary forces that initiate the movement of water
- Secondary forces that influence the currents to flow.

The primary forces that influence the currents are:

- heating by solar energy
- wind
- gravity
- coriolis force

Temperature difference and salinity difference are the secondary forces.

Differences in water density affect vertical mobility of ocean currents. Water with high salinity is denser than water with low salinity and in the same way cold water is denser than warm water. Denser water tends to sink, while relatively lighter water tends to rise. Cold-water ocean currents occur when the cold water at the poles sinks and slowly moves towards the equator. Warm-water currents travel out from the equator along the surface, flowing towards the poles to replace the sinking cold water.

Q.47) With reference to Southern Ocean, consider the following statements:

1. It comprises the southernmost waters of the world ocean, generally taken to be south of 60° South latitude.
2. It is regarded as the smallest of the principal oceanic divisions.
3. Kara Sea and Leptev Sea are part of Southern Ocean.

Which of the above statements is/are correct?

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

Q.47) Solution (a)

The Southern Ocean, also known as the Antarctic Ocean comprises the southernmost waters of the World Ocean, generally taken to be south of 60° S latitude and encircling Antarctica.

It is regarded as the second-smallest of the five principal oceanic divisions: smaller than the Pacific, Atlantic, and Indian oceans but larger than the Arctic Ocean.

Kara Sea and Leptev Sea are part of Arctic Ocean. Major Seas of Southern Ocean are:

- Weeddell Sea
- Somov Sea
- Riiser- Larsen Sea
- Lazarev Sea
- Scotia Sea

Q.48) What is are the effects of Ocean Currents?

1. Warm ocean currents have a direct effect on desert formation in west coast regions of the tropical and subtropical continents.
2. Mixing of cold and warm ocean currents create the richest fishing grounds in the world.
3. Cold ocean currents in west coasts of the continents in the middle and higher latitudes leads to cool summers and relatively mild winters.

Which of the above statements is/are correct?

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

Q.48) Solution (b)

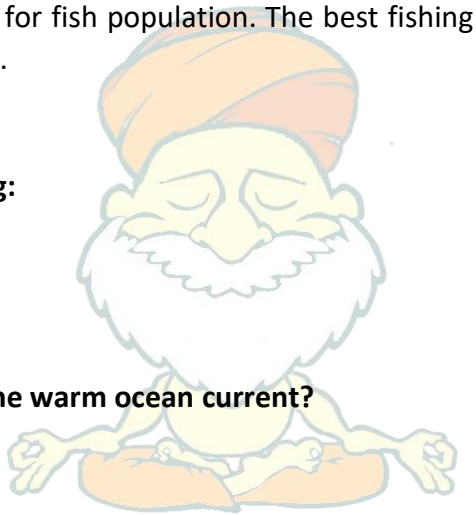
Ocean currents have a number of direct and indirect influences on human activities.

Cold ocean currents have a direct effect on desert formation in west coast regions of the tropical and subtropical continents. West coasts of the continents in tropical and subtropical latitudes (except close to the equator) are bordered by cool waters. Their average temperatures are relatively low with a narrow diurnal and annual ranges. There is fog, but generally the areas are arid.

Warm ocean currents in west coasts of the continents in the middle and higher latitudes leads to cool summers and relatively mild winters. West coasts of the continents in the middle and higher latitudes are bordered by warm waters which cause a distinct marine climate. They are characterised by cool summers and relatively mild winters with a narrow annual range of temperatures.

Warm currents flow parallel to the east coasts of the continents in tropical and subtropical latitudes. This results in warm and rainy climates. These areas lie in the western margins of the subtropical anti-cyclones.

The mixing of warm and cold currents help to replenish the oxygen and favour the growth of planktons, the primary food for fish population. The best fishing grounds of the world exist mainly in these mixing zones.



Q.49) Consider the following:

1. Humboldt Current
2. Florida Current
3. Irminger Current

Which of the above is/are the warm ocean current?

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

Q.49) Solution (c)

The Humboldt Current, also called the Peru Current, is a cold, low-salinity ocean current that flows north along the western coast of South America. The Humboldt has a considerable cooling influence on the climate of Chile, Peru and Ecuador. It is also largely responsible for the aridity of Atacama Desert in northern Chile and coastal areas of Peru and also of the aridity of southern Ecuador.

The Florida Current is a warm ocean current that flows from the Straits of Florida around the Florida Peninsula and along the southeastern coast of the United States before joining the Gulf Stream Current near Cape Hatteras. The Florida Current results from the movement of water pushed from the Atlantic into the Caribbean Sea by the rotation of the Earth (which exerts a greater force at the equator).

The Irminger Current is a north Atlantic ocean current setting westward off the southwest coast of Iceland. It is composed of relatively warm and saline waters from the eastern North Atlantic that are fed by the North Atlantic Drift. The Irminger Current is part of the North Atlantic subpolar gyre.

Q.50) Consider the following statements:

1. Ekman Spiral is the result of Coriolis force on the movement of surface water.
2. Ekman Spiral gives rise to Gyres.

Which of the above statements is/are correct?

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

Q.50) Solution (c)

The Ekman spiral is a structure of currents or winds near a horizontal boundary in which the flow direction rotates as one moves away from the boundary. Ekman Spiral is the result of Coriolis force on the movement of surface water. When surface water molecules move by the force of the wind, they, in turn, drag deeper layers of water molecules below them. Each layer of water molecules is moved by friction from the shallower layer, and each deeper layer moves more slowly than the layer above it, until the movement ceases at a depth of about 100 meters (330 feet). Like the surface water, however, the deeper water is deflected by the Coriolis effect to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.

As a result, each successively deeper layer of water moves more slowly to the right or left, creating a spiral effect. Because the deeper layers of water move more slowly than the shallower layers, they tend to "twist around" and flow opposite to the surface current.

Ekman Spiral gives rise to 'Gyres'. These are ocean-circling currents that occur north and south of the equator. They do not occur at the equator, where the Coriolis Effect is not present.

Q.51) "Ocean rewilding", seen sometimes in news, is:

a) Introduction of debris clean up boats, debris sweepers and sea-bins to remove plastics and other wastes carried into water bodies.
b) Technique of reintroducing plant and animal life in the oceans and allowing them to grow without human interferences.
c) A global platform to build partnerships and enhance capacity to achieve the Aichi Biodiversity Targets related to marine and coastal biodiversity in a holistic manner.

d) An initiative of United Nations to tackle marine plastic pollution.

Q.51) Solution (b)

Ocean rewilding refers to reintroducing key plant and animal life into the spaces they are needed, allowing them to grow without human interference.

Ocean rewilding is now considered to be as crucial and effective as land efforts, due to the ocean's innate capabilities to store "blue carbon" in their seagrass meadows, tidal marshes and mangroves.

It is estimated that the --average annual carbon sequestration rate for mangroves averages between two to four times greater than global rates observed in mature tropical forests.

Marine populations are also served better by ocean rewilding schemes that prevent their ecosystems from devastating human interference. This can include protections against damaging activities such as trawling and dredging from marine sediments.

Q.52) With reference to coral bleaching, consider the following statements:

1. Colours in corals come from a marine algae called zooxanthellae.
2. When corals get stressed, from heat or pollution, they react by expelling Zooxanthallae resulting in coral bleaching.
3. Once bleaching occurs corals never recover from it.

Which of the above statements is/are correct?

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

Q.52) Solution (b)

The stunning colours in corals come from a marine algae called zooxanthellae, which live inside their tissues. This algae provides the corals with an easy food supply thanks to photosynthesis, which gives the corals energy, allowing them to grow and reproduce.

When corals get stressed, from things such as heat or pollution, they react by expelling this algae, leaving a ghostly, transparent skeleton behind. This is known as 'coral bleaching'. Some corals can feed themselves, but without the zooxanthellae most corals starve.

In some instances corals can recover from bleaching. If conditions return to normal, and stay that way corals can regain their algae, return to their bright colours and survive. However prolonged warmer temperatures and other stressors, like poor water quality, can leave the living coral in a weakened state. It can struggle to regrow, reproduce and resist disease – so is very vulnerable to coral diseases and mortality.

It can take decades for coral reefs to fully recover from a bleaching event, so it is vital that these events do not occur frequently.

Q.53) Consider the following statements:

1. Fringing reefs grow near the coastline around islands and continents.
2. Barrier reefs are the most common type of reef.
3. Atolls are rings of coral that create protected lagoons and are usually located in the middle of the sea.

Which of the above statements is/are correct?

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

Q.53) Solution (c)

Coral reefs are divided into four classes: fringing reefs, barrier reefs, atolls, and patch reefs.

Fringing reefs grow near the coastline around islands and continents. They are separated from the shore by narrow, shallow lagoons. Fringing reefs are the most common type of reef that we see.

Barrier reefs also parallel the coastline but are separated by deeper, wider lagoons. At their shallowest point, they can reach the water's surface forming a "barrier" to navigation. The Great Barrier Reef in Australia is the largest and most famous barrier reef in the world.

Atolls are rings of coral that create protected lagoons and are usually located in the middle of the sea. Atolls usually form when islands surrounded by fringing reefs sink into the sea or the sea level rises around them (these islands are often the tops of underwater volcanoes). The fringing reefs continue to grow and eventually form circles with lagoons inside.

Patch reefs are small, isolated reefs that grow up from the open bottom of the island platform or continental shelf. They usually occur between fringing reefs and barrier reefs. They vary greatly in size, and they rarely reach the surface of the water.

Q.54) Consider the following statements:

1. Lake Victoria is part of rift valley lakes of Africa.
2. Kolleru Lake is the largest lagoon in India.
3. The Great Lakes of North America are a series of interconnected freshwater lakes which connect to the Pacific Ocean.

Which of the above statements is/are correct?

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

Q.54) Solution (a)

Great Lakes of North America are a series of interconnected freshwater lakes which connect to the Atlantic Ocean through the Saint Lawrence Seaway. Great Lakes consist of Lakes Superior, Michigan, Huron, Erie, and Ontario. Lake Superior is the largest continental lake in the world by area, and Lake Michigan is the largest lake that is entirely within one country.

African Great Lakes are a series of lakes constituting the part of the Rift Valley lakes in and around the East African Rift. They include Lake Victoria, the second largest fresh water lake in the world, and Lake Tanganyika, the world's second largest in volume as well as the second deepest.

Chilika Lake is the largest lagoon of India while Kolleru Lake is largest fresh water lake in India.

Q.55) Consider the following statements:

1. India is the largest user of groundwater in the world.
2. Out of total groundwater available 90% is used for domestic purposes.
3. Central Ground Water Authority has been constituted under the Environment (Protection) Act of 1986 for Sustainable development and management of India's Ground Water Resources.

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.55) Solution (b)

India is the largest user of ground water in the world, extracting ground water to the tune of 253 bcm per year, which is about 25% of the global ground water extraction.

Ground water extraction in India is primarily for irrigation in agricultural activities, accounting for nearly 228 BCM (Billion Cubic Meter), which amounts to 90% of the annual ground water extraction. The remaining 10% of extraction (25 BCM) is for drinking & domestic as well as industrial uses. Industrial use is estimated to account for only about 5% of the annual ground water extraction in the country.

Central Ground Water Authority (CGWA), constituted under the Environment (Protection) Act of 1986 has the mandate of regulating ground water development and management in the country. CGWA has been regulating ground water development for its sustainable management in the country through measures such as issue of advisories, public notices, and grant of No Objection Certificates (NOC) for ground water withdrawal.

Q.56) Which of the following factors are responsible for sea level changes?

1. Thermal expansion of the ocean
2. Melting of non polar glaciers
3. Changes in volume of the ice caps of Antarctica and Greenland

Choose the correct answer from the codes given below:

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

Q.56) Solution (d)

Three factors primarily responsible for sea level change are:

- Thermal expansion of the ocean
- Melting of nonpolar glaciers
- Change in the volume of the ice caps of Antarctica and Greenland

As the global climate warms, the average level of the ocean is gradually increasing, because warmer water occupies a greater volume. The warmer climate also is causing the melting of mountain and nonpolar glaciers, which adds volume to the oceans.

A rise in sea level causes five primary physical effects:

- Erosion of beaches and bluffs
- Increased flooding and storm damage
- Inundation of low-lying areas
- Salt-water intrusion into aquifers and surface waters
- Higher water tables

Q.57) Consider the following statements regarding MERPOL convention:

1. Its objective is to take all practicable steps to prevent pollution of the sea by dumping of wastes and other matter.
2. It is developed by International Maritime Organization.
3. India is a signatory to this convention.

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.57) Solution (c)

MERPOL Convention covers pollution of the marine environment by ships from operational or accidental causes.

It lists various forms of marine pollution caused by oil, noxious liquid substances, and harmful substances in packaged form, sewage and garbage from ships, etc.

The Protocol of 1978 was adopted in response to a number of tanker accidents in 1976–1977.

It is one of the most important international marine environmental conventions.

India is a signatory to MARPOL.

Q.58) Consider the following:

1. Wheat Bran
2. Volcanic ash
3. shavings of polyester-derived plastic

Which of the above can be used for the cleanup of marine oil spills?

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

Q.58) Solution (d)

Oil Spill is an accidental/uncontrolled release of crude oil, gasoline, fuels, or other oil by-products into the environment. Oil spills can pollute land, air, or water, though it is mostly used for oceanic oil spills.

Various sorbents like straw, volcanic ash, and shavings of polyester-derived plastic that absorb the oil from the water are used.

The National Institute of Ocean Technology (NIOT) has developed an eco-friendly crude oil bioremediation mechanism technology using consortia (group of two or more species) of marine microbes wheat bran (WB) immobilized (microbes controlled degradation) on agro-residue bacterial cells. These hydrocarbon degrading bacteria don't depend on hydrocarbon

for survival, but have a metabolic mechanism where they use petroleum products as carbon and energy source and thus, help cleaning up oil spills.

Q.59) Consider the following statements:

1. Oligotrophic lakes are those which are rich in nutrient content.
2. In India most of the lakes are oligotrophic.

Which of the above statements is/are correct?

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

Q.59) Solution (d)

The nutrient-enrichment of the lakes promotes the growth of algae, aquatic plants and various fauna. This process is known as natural eutrophication.

Cultural eutrophication occurs when human water pollution speeds up the aging process by introducing sewage, detergents, fertilizers, and other nutrient sources into the ecosystem.

On the basis of their nutrient content, lakes are categorized as

- Oligotrophic - very low nutrient content
- Mesotrophic- moderate nutrient content
- Eutrophic- highly nutrient rich

A vast majority of lakes in India are either eutrophic or mesotrophic because of the nutrients derived from their surroundings or organic wastes entering them.

Q.60) With reference to "Blue Nature Alliance", consider the following statements:

1. It is an initiative led by United Nations Environment Programme.
2. It aims to protect 5% of the world ocean in five years.
3. Fiji, Seychelles, Canada are conservation target ocean location of this alliance.

Which of the above statements is/are correct?

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

Q.60) Solution (b)

Blue Nature Alliance is a global partnership. It was founded and led by Conservation International, Pew Charitable Trusts, Global Environment Facility(GEF), Minderoo Foundation and Rob & Melani Walton Foundation.

It aims to safeguard global ocean biodiversity, build resilience to climate change, promote human well-being and enhance ecosystem connectivity.

The alliance has a target to:

- Conserve 18 million square kilometres of ocean in five years.
- Protect 5% of the world's ocean in five years.
- Help the world achieve 30% ocean conservation by 2030.

The Alliance has started by targeting seven ocean locations. This includes Antarctica, Fiji, Canada, Seychelles, Palau, the Western Indian Ocean and Tristan da Cunha, an island in the South Atlantic Ocean.

Q.61) Consider the following statements:

1. The part of India lying north of the Tropic of Cancer experience small daily and annual range of temperature.
2. The Himalayas act as an effective climate divide between India and Central Asia.

Which of the above statements is/are correct?

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

Q.61) Solution (b)

The Tropic of Cancer passes through the central part of India in east-west direction. Thus, northern part of the India lies in sub-tropical and temperate zone and the part lying south of the Tropic of Cancer falls in the tropical zone. The tropical zone being nearer to the equator, experiences high temperatures throughout the year with small daily and annual range. Area north of the Tropic of Cancer being away from the equator, experiences extreme climate with high daily and annual range of temperature.

The Himalayas in the north along with its extensions act as an effective climatic divide. The towering mountain chain provides an invincible shield to protect the subcontinent from the cold northern winds. These cold and chilly winds originate near the Arctic Circle and blow across central and eastern Asia. The Himalayas also trap the monsoon winds, forcing them to shed their moisture within the subcontinent.

Q.62) What are the factors responsible for diversity in flora and fauna?

1. Type of Land
2. Type of Soil
3. Photoperiod

Choose the correct answer from the codes given below:

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

Q.62) Solution (d)

The term flora is used to denote plants of a particular region or period. Similarly, the species of animals are referred to as fauna. This huge diversity in flora and fauna kingdom is due to the following factors:

Land: Land affects the natural vegetation directly and indirectly. Do you expect the same type of vegetation in mountainous, plateau and plain areas or in dry and wet regions? The nature of land influences the type of vegetation. The fertile level is generally devoted to agriculture. The undulating and rough terrains are areas where grassland and woodlands develop and give shelter to a variety of wildlife.

Soil: The soils also vary over space. Different types of soils provide basis for different types of vegetation. The sandy soils of the desert support cactus and thorny bushes, while wet, marshy, deltaic soils support mangroves and deltaic vegetation. The hill slopes with some depth of soil have conical trees.

Photoperiod (Sunlight): The variation in duration of sunlight at different places is due to differences in latitude, altitude, season and duration of the day. Due to longer duration of sunlight, trees grow faster in summer.

Q.63) Consider the following:

1. Annual rainfall between 100 to 200 cm.
2. Exist along the foothills of the Himalayas and eastern slopes of the Western Ghats.
3. Teak is the most dominant species.

The above features are the chief characteristics of:

a) Tropical Dry Evergreen Forests
b) Tropical Dry Deciduous Forests
c) Tropical Moist Deciduous Forests
d) Tropical Semi-Evergreen Forests

Q.63) Solution (c)

Tropical Moist Deciduous Forests:

- The Moist deciduous forests are more pronounced in the regions which record rainfall between 100-200 cm.
- The trees drop their leaves during the spring and early summer when sufficient moisture is not available.
- The general appearance is bare in extreme summers (April-May).
- Tropical moist deciduous forests present irregular top storey (25 to 60 m).
- Heavily buttressed trees and fairly complete undergrowth.
- These forests occupy a much larger area than the evergreen forests but large tracts under these forests have been cleared for cultivation.
- These forests are found in the northeastern states along the foothills of Himalayas, eastern slopes of the Western Ghats and Odisha.
- Teak, sal, shisham, hurra, mahua, amla, semul, kusum, and sandalwood etc. are the main species of these forests.

Q.64) In which of the following regions Tropical Dry Evergreen Forests are found?

a) Coasts of Tamil Nadu
b) Hills of eastern Madhya Pradesh
c) Hilly regions of Arunachal Pradesh
d) Higher hills of Tamil Nadu and Kerala

Q.64) Solution (a)

Tropical Dry Evergreen Forests:

- Annual rainfall of 100 cm (mostly from the north-east monsoon winds in October – December).
- Mean annual temperature is about 28°C.
- The mean humidity is about 75 per cent.
- They are found along the coasts of Tamil Nadu.
- The trees grow up to the height of up to 12 m, with complete canopy
- The important species are jamun, tamarind, neem, etc

Q.65) Consider the following statements:

1. Tropical Dry Deciduous Forests are found in the Chota Nagpur Plateau.
2. Agar, Rhizopora and Canes are dominant species of Sub-tropical Moist Pine Forests
3. Montane Wet Temperate Forests are found in the higher hills of Tamil Nadu and Kerala.

Which of the above statements is/are correct?

a) 1 only
b) 1 and 2 only

c) 3 only
d) 1, 2 and 3

Q.65) Solution (c)

Tropical Dry Deciduous Forests:

- These forests occur in the areas having annual rainfall of 100-150 cm.
- These forests shed their leaves in dry season.
- They occur in an irregular wide strip running from the foot of the Himalayas to Kanyakumari except in Rajasthan, Western Ghats and West Bengal.
- The important species are teak, axlewood, rosewood, common bamboo, red sanders, laurel, satinwood, etc.

Agar, Rhizopora and Canes are dominant species Littoral and Swamp forests. Littoral (relating to or on the shore of the sea or a lake) forests occur at several places along the coast. Swamp forests are confined to the deltas of the Ganga, the Mahanadi, the Godavari, the Krishna and the Cauvery.

Montane Wet Temperate Forests:

- These forests grow at a height of 1800 to 3000 m above sea level.
- Mean annual rainfall is 150 cm to 300 cm.
- These are found in the higher hills of Tamil Nadu and Kerala, in the Eastern Himalayan region.
- These are closed evergreen forests. Trunks have large girth.
- Deodar, Chilauni, Indian chestnut, birch, plum, machilus, cinnamomum, litsea, magnolia, blue pine, oak, hemlock, etc. are important species.

Q.66) Which of the following pairs are correctly matched?

(Grasslands)	(Belong to)
1. Khajjiar	Himachal Pradesh
2. Ukhrul	Sikkim
3. Saramati	Gujarat
4. Bugyal	Uttarakhand

Choose the correct answer from the codes given below:

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

Q.66) Solution (d)

Grasslands are open areas of land where grasses or grass like plants are the dominant species. Other forms of vegetation such as trees are rare in grasslands because they are not suited to thrive in the grassland's dry environment.

Grasslands receive water through rainfall, and when it does occur the grasses use their roots to search for moisture. Grass within this type of environment reproduces by releasing pollen when the winds blow or by producing plants from their roots.

About 24% of land in India is covered with grasslands.

The major types of grasslands in India are:

- Alpine moist meadows of the Greater Himalayas
- Alpine arid pastures or steppe formations of the trans Himalayas
- Hillside grasslands in the mid-elevation ranges of the Himalayas
- 'Chaurs' of the Himalayan foothills
- 'Terai' grasslands on the Gangetic and the Brahmaputra floodplains
- 'Phumdis' or floating grasslands of Manipur
- 'Banni' and 'Vidis' of Gujarat
- Savannas of western and peninsular India
- Plateau and valley grasslands in the Satpuras and Maikal hills
- Dry grasslands of the Andhra Pradesh and Tamil Nadu plains
- Ukhrul grasslands of Manipur
- Saramati grassland of Nagaland
- Bugyal grasslands of Uttarakhand
- Khajjiar grasslands of Himachal Pradesh
- 'Shola' grasslands of the Western Ghats

Q.67) The Tamil Nadu Coast remains dry during southwest monsoon because:

1. It is situated parallel to the Arabian Sea branch of southwest monsoon.
2. It lies in the rainshadow area of the Bay of Bengal branch of the south-west monsoon.

Choose the correct answer from the codes given below:

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

Q.67) Solution (d)

As a result of rapid increase of temperature in May over the northwestern plains, the low pressure conditions over there get further intensified. By early June, they are powerful enough to attract the trade winds of Southern Hemisphere coming from the Indian Ocean.

These southeast trade winds cross the equator and enter the Bay of Bengal and the Arabian Sea, only to be caught up in the air circulation over India. Passing over the equatorial warm currents, they bring with them moisture in abundance. After crossing the equator, they follow a southwesterly direction. That is why they are known as southwest monsoons.

The rain in the southwest monsoon season begins rather abruptly. One result of the first rain is that it brings down the temperature substantially. This sudden onset of the moisture-laden winds associated with violent thunder and lightening, is often termed as the "break" or "burst" of the monsoons. The monsoon may burst in the first week of June in the coastal areas of Kerala, Karnataka, Goa and Maharashtra while in the interior parts of the country, it may be delayed to the first week of July. The day temperature registers a decline of 5°C to 8°C between midJune and mid-July.

As these winds approach the land, their southwesterly direction is modified by the relief and thermal low pressure over the northwest India. The monsoon approaches the landmass in two branches:

- The Arabian Sea branch
- The Bay of Bengal branch

Tamil Nadu Coast remains dry during southwest monsoon because:

- The Tamil Nadu coast is situated parallel to the Bay of Bengal branch of southwest monsoon.
- It lies in the rainshadow area of the Arabian Sea branch of the south-west monsoon.

Q.68) With reference to Monsoonal rainfall, consider the following statements:

1. It is seasonal in character.
2. It is largely governed by relief or topography.
3. It increases with increasing distance from the sea.

Which of the above statements is/are correct?

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

Q.68) Solution (b)

Characteristics of Monsoonal Rainfall are:

- Rainfall received from the southwest monsoons is seasonal in character, which occurs between June and September.
- Monsoonal rainfall is largely governed by relief or topography. For instance the windward side of the Western Ghats register a rainfall of over 250 cm. Again, the

heavy rainfall in the north-eastern states can be attributed to their hill ranges and the Eastern Himalayas.

- The monsoon rainfall has a declining trend with increasing distance from the sea. Kolkata receives 119 cm during the southwest monsoon period, Patna 105 cm, Allahabad 76 cm and Delhi 56 cm.
- The monsoon rains occur in wet spells of few days duration at a time. The wet spells are interspersed with rainless interval known as 'breaks'. These breaks in rainfall are related to the cyclonic depressions mainly formed at the head of the Bay of Bengal, and their crossing into the mainland. Besides the frequency and intensity of these depressions, the passage followed by them determines the spatial distribution of rainfall.
- The summer rainfall comes in a heavy downpour leading to considerable run off and soil erosion.
- Monsoons play a pivotal role in the agrarian economy of India because over three-fourths of the total rain in the country is received during the southwest monsoon season.
- Its spatial distribution is also uneven which ranges from 12 cm to more than 250 cm.
- The beginning of the rains sometimes is considerably delayed over the whole or a part of the country.
- The rains sometimes end considerably earlier than usual, causing great damage to standing crops and making the sowing of winter crops difficult.

Q.69) Consider the following statements:

1. In India the months of October and November are known for retreating monsoon.
2. The weather in the retreating monsoon is associated with a dry spell in the eastern part of the Peninsula.
3. The season of retreating monsoon is associated with cyclonic depressions which originate over the Andaman Sea.

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.69) Solution (b)

Season of Retreating Monsoon the months of October and November are known for retreating monsoons. By the end of September, the southwest monsoon becomes weak as the low pressure trough of the Ganga plain starts moving southward in response to the southward march of the sun.

The monsoon retreats from the western Rajasthan by the first week of September. It withdraws from Rajasthan, Gujarat, Western Ganga plain and the Central Highlands by the end of the month. By the beginning of October, the low pressure covers northern parts of the Bay of Bengal and by early November, it moves over Karnataka and Tamil Nadu. By the middle of December, the centre of low pressure is completely removed from the Peninsula.

The retreating southwest monsoon season is marked by clear skies and rise in temperature. The land is still moist. Owing to the conditions of high temperature and humidity, the weather becomes rather oppressive. This is commonly known as the 'October heat'. In the second half of October, the mercury begins to fall rapidly, particularly in northern India. The weather in the retreating monsoon is dry in north India but it is associated with rain in the eastern part of the Peninsula. Here, October and November are the rainiest months of the year.

The widespread rain in this season is associated with the passage of cyclonic depressions which originate over the Andaman Sea and manage to cross the eastern coast of the southern Peninsula. These tropical cyclones are very destructive. The thickly populated deltas of the Godavari, Krishna and Kaveri are their preferred targets. Every year cyclones bring disaster here. A few cyclonic storms also strike the coast of West Bengal, Bangladesh and Myanmar. A bulk of the rainfall of the Coromandal coast is derived from these depressions and cyclones. Such cyclonic storms are less frequent in the Arabian Sea.

Q.70) Consider the following statements:

1. When the sun shines vertically over the Tropic of Capricorn in the Southern hemisphere high pressure develops over North-western India due to low temperatures.
2. Most parts of India do not have rainfall in the winter season due to the presence of anti cyclonic circulation on land.

Which of the above statements is/are correct?

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

Q.70) Solution (c)

By the end of December (22nd December), the sun shines vertically over the Tropic of Capricorn in the southern hemisphere. The weather in this season is characterised by feeble high pressure conditions over the northern plain. In south India, the air pressure is slightly lower.

As a result, winds start blowing from northwestern high pressure zone to the low air pressure zone over the Indian Ocean in the south. Due to low pressure gradient, the light

winds with a low velocity of about 3-5 km per hour begin to blow outwards. By and large, the topography of the region influences the wind direction. They are westerly or northwesterly down the Ganga Valley. They become northerly in the Ganga-Brahmaputra delta. Free from the influence of topography, they are clearly northeasterly over the Bay of Bengal.

Winter monsoons do not cause rainfall as they move from land to the sea. It is because firstly, they have little humidity; and secondly, due to anti cyclonic circulation on land, the possibility of rainfall from them reduces. So, most parts of India do not have rainfall in the winter season.

Q.71) Consider the following statements regarding the Inter Tropical Convergence Zone (ITCZ):

1. It is a zone of high pressure.
2. In the month of July it forms the monsoon trough over the Gangetic plain.
3. Monsoon trough encourages the development of thermal low pressure over north and northwest India.

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.71) Solution (c)

The Inter Tropical Convergence Zone (ITCZ) is a low pressure zone located at the equator where trade winds converge, and so, it is a zone where air tends to ascend.

In July, the ITCZ is located around 20°N-25°N latitudes (over the Gangetic plain), sometimes called the monsoon trough.

This monsoon trough encourages the development of thermal low over north and northwest India. Due to the shift of ITCZ, the trade winds of the southern hemisphere cross the equator between 40° and 60°E longitudes and start blowing from southwest to northeast due to the Coriolis force. It becomes southwest monsoon.

In winter, the ITCZ moves southward, and so the reversal of winds from northeast to south and southwest, takes place. They are called northeast monsoons.

Q.72) Consider the following statements:

a) The southwest monsoon is a continuation of the southeast trades winds deflected towards the Indian subcontinent after crossing the Equator.

b) Much of the rainfall along the Western Ghats is convectional.
c) The intensity of rainfall over the east coast of India depends upon the position of the equatorial jet stream along the eastern coast of Africa.

Which of the above statements is/are correct?

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

Q.72) Solution (a)

During April and May when the sun shines vertically over the Tropic of Cancer, the large landmass in the north of Indian Ocean gets intensely heated. This causes the formation of an intense low pressure in the north-western part of the subcontinent. Since the pressure in the Indian Ocean in the south of the landmass is high as water gets heated slowly, the low pressure cell attracts the southeast trades across the Equator. These conditions help in the northward shift in the position of the ITCZ. The southwest monsoon may thus, be seen as a continuation of the southeast trades deflected towards the Indian subcontinent after crossing the Equator. These winds cross the Equator between 40°E and 60°E longitudes.

There are two rain-bearing systems in India:

i. First originate in the Bay of Bengal causing rainfall over the plains of north India.
ii. Second is the Arabian Sea current of the southwest monsoon which brings rain to the west coast of India.

Much of the rainfall along the Western Ghats is orographic as the moist air is obstructed and forced to rise along the Ghats.

The intensity of rainfall over the west coast of India is, however, related to two factors:

- The offshore meteorological conditions.
- The position of the equatorial jet stream along the eastern coast of Africa

Q.73) With reference to El-Nino, consider the following statements:

1. It is a climatic pattern that describes the unusual warming of surface waters in the eastern tropical Pacific Ocean.
2. It is an extension of the warm equatorial current which gets replaced temporarily by cold Peruvian current.
3. Strong El Nino events contribute to stronger monsoons in India.

Which of the above statements is/are correct?

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

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

Q.73) Solution (a)

EI-Nino is a complex weather system that appears once every three to seven years, bringing drought, floods and other weather extremes to different parts of the world.

The system involves oceanic and atmospheric phenomena with the appearance of warm currents off the coast of Peru in the Eastern Pacific Ocean and affects weather in many places including India.

EI-Nino is merely an extension of the warm equatorial current which gets replaced temporarily by cold Peruvian current or Humbolt current. This current increases the temperature of water on the Peruvian coast by 10°C. This results in:

- The distortion of equatorial atmospheric circulation;
- Irregularities in the evaporation of sea water;
- Reduction in the amount of planktons which further reduces the number of fish in the sea.

The word EI-Nino means 'Child Christ' because this current appears around Christmas in December. December is a summer month in Peru (Southern Hemisphere).

Strong El Nino events contribute to weaker monsoons and even droughts in India Southeast Asia.

EI-Nino is used in India for forecasting long range monsoon rainfall. In 1990-91, there was a wild EI-Nino event and the onset of southwest monsoon was delayed over most parts of the country ranging from five to twelve days.

Q.74) Which of the following statements is/are correct regarding ICAR classification of Indian Soils order as per the United States Department of Agriculture soil taxonomy:

1. Entisols are associated with recently deposited sediments from wind, water, or ice erosion.
2. Vertisols are the soils that develop in very dry environments.
3. Most of the area of India comes under Alfisols soils order.

Choose the correct answer from the codes given below:

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

Q.74) Solution (a)

The National Bureau of Soil Survey and the Land Use Planning an Institute under the control of the Indian Council of Agricultural Research (ICAR) did a lot of studies on Indian soils. In their effort to study soil and to make it comparable at the international level, the ICAR has classified the Indian soils on the basis of their nature and character as per the United States Department of Agriculture (USDA) Soil Taxonomy.

Entisols are immature soils that lack the vertical development of horizons. These soils are often associated with recently deposited sediments from wind, water or ice erosion.

Vertisols are heavy clay soils that show significant expansion and contraction due to the presence or absence of moisture. These are common in areas that have shale parent material and heavy precipitation.

Aridisols soils develop in very dry environments.

According to ICAR in India major area (39.74%) comes under the Inceptisol soils which are young soils that are more developed than entisols.

Q.75) Consider the following characteristics of Soil:

1. Cover about 40 per cent of the total area of the country.
2. They are depositional soils.
3. In the Peninsular region, they are found in deltas of the east coast and in the river valleys.
4. These are intensively cultivated.

Which of the following soils shows above characteristics?

a) Black Soil
b) Laterite Soil
c) Saline Soil
d) Alluvial Soil

Q.75) Solution (d)

Alluvial Soils

- 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.
- These soils are more loamy and clayey in the lower and middle Ganga plain and the Brahamaputra valley. The sand content decreases from the west to east.

- 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.76) Which of the following statements is/are correct regarding the difference between Khadar and Bhangar:

1. Bhangar is the new alluvium while Khadar is old alluvium.
2. Khadar soils are more fertile than Bhangar soils

Choose the correct answer from the codes given below:

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

Q.76) Solution (b)

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.
- Bhangar soils are less fertile as they are above flood level whereas Khadar soils are more fertile as they are below flood level.
- Bhanger is full of kankers (lime nodules) while khadar soil is composed of fine silt and clay.

Q.77) Which of the following is/are the characteristic features of regur soils?

1. These are generally impermeable.
2. These are rich in organic matter.
3. They lack in phosphorous and nitrogen

Choose the correct answer from the codes given below:

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

Q.77) Solution (b)

Black soils or regur soils:

- Black soil covers most of the Deccan Plateau which includes parts of Maharashtra, Madhya Pradesh, Gujarat, Andhra Pradesh and some parts of Tamil Nadu.
- In the upper reaches of the Godavari and the Krishna, and the north western part of the Deccan Plateau, the black soil is very deep.
- These soils are also known as the 'Regur Soil' or the 'Black Cotton Soil'.
- 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.
- 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.

Q.78) Consider the following statements:

1. Saline soils contain a larger proportion of sodium, potassium and magnesium.
2. In the areas of green revolution, the fertile alluvial soils are becoming saline.
3. The salinity in the soil can be checked by adding gypsum.

Which of the above statements is/are correct?

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

Q.78) Solution (d)

Saline Soils

- They are also known as Usara soils. Saline soils contain a larger proportion of sodium, potassium and magnesium, and thus, they are infertile, and do not support any vegetative growth.
- They have more salts, largely because of dry climate and poor drainage. They occur in arid and semi-arid regions, and in waterlogged and swampy areas.
- Their structure ranges from sandy to loamy.
- They lack in nitrogen and calcium.
- Saline soils are more widespread in western Gujarat, deltas of the eastern coast and in Sunderban areas of West Bengal. In the Rann of Kuchchh, the Southwest Monsoon brings salt particles and deposits there as a crust.
- Seawater intrusions in the deltas promote the occurrence of saline soils.

- In the areas of intensive cultivation with excessive use of irrigation, especially in areas of green revolution, the fertile alluvial soils are becoming saline.
- Excessive irrigation with dry climatic conditions promotes capillary action, which results in the deposition of salt on the top layer of the soil.
- In such areas, especially in Punjab and Haryana, farmers are advised to add gypsum to solve the problem of salinity in the soil.

Q.79) Which of the following statements is/are correct regarding Red Soils?

1. The soil develops a reddish colour due to a wide diffusion of iron in crystalline and metamorphic rocks.
2. These are suitable for the cultivation of tea and coffee.

Choose the correct answer from the codes given below:

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

Q.79) Solution (a)

Red soil develops on crystalline igneous rocks in areas of low rainfall in the eastern and southern part of the Deccan Plateau.

Along the piedmont zone of the Western Ghat, long stretch of area is occupied by red loamy soil. Yellow and red soils are also found in parts of Odisha and Chattisgarh and in the southern parts of the middle Ganga plain.

The soil develops a reddish colour due to a wide diffusion of iron in crystalline and metamorphic rocks. It looks yellow when it occurs in a hydrated form. The fine-grained red and yellow soils are normally fertile, whereas coarse-grained soils found in dry upland areas are poor in fertility.

They are generally poor in nitrogen, phosphorous and humus.

Crops suitable for red soils are cotton, wheat, rice, pulses, millets, tobacco, oilseeds, potatoes and fruits.

The red soils are mostly loamy and therefore cannot retain water like the black soils.

Q.80) Consider the following statements regarding laterite soils:

1. These are the result of intense leaching due to tropical rains.
2. These are poor in iron oxide and potash.
3. These are suitable for tree crops like cashewnut.

Which of the above statements is/are correct?

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

Q.80) Solution (c)

Laterite Solis:

- Laterite Soil Laterite has been derived from the Latin word 'Later' which means brick. The laterite soils develop in areas with high temperature 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 aluminium compound are left behind.
- Humus content of the soil is removed fast by bacteria that thrive 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; however, application of manures and fertilisers are required for making the soils fertile 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.81) Which of the following are the factors that influence the distribution of population?

1. Availability of water
2. Political System
3. Urbanisation

Choose the correct answer from the codes given below:

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

Q.81) Solution (d)

Factors influencing the distribution of Population are:

I. Geographical Factors

- Availability of water: Water is the most important factor for life. So, people prefer to live in areas where fresh water is easily available. Water is used for drinking, bathing and cooking – and also for cattle, crops, industries and navigation. It is because of this that river valleys are among the most densely populated areas of the world.
- Landforms: People prefer living on flat plains and gentle slopes. This is because such areas are favourable for the production of crops and to build roads and industries. The mountainous and hilly areas hinder the development of transport network and hence initially do not favour agricultural and industrial development. So, these areas tend to be less populated. The Ganga plains are among the most densely populated areas of the world while the mountains zones in the Himalayas are scarcely populated.
- Climate: An extreme climate such as very hot or cold deserts are uncomfortable for human habitation. Areas with a comfortable climate, where there is not much seasonal variation attract more people. Areas with very heavy rainfall or extreme and harsh climates have low population. Mediterranean regions were inhabited from early periods in history due to their pleasant climate.
- Soils: Fertile soils are important for agricultural and allied activities. Therefore, areas which have fertile loamy soils have more people living on them as these can support intensive agriculture.

II. Economic Factors

- Minerals: Areas with mineral deposits attract industries. Mining and industrial activities generate employment. So, skilled and semi–skilled workers move to these areas and make them densely populated. Katanga Zambia copper belt in Africa is one such good example.
- Urbanisation: Cities offer better employment opportunities, educational and medical facilities, better means of transport and communication. Good civic amenities and the attraction of city life draw people to the cities. It leads to rural to urban migration and cities grow in size. Mega cities of the world continue to attract large number of migrants every year.
- Industrialisation: Industrial belts provide job opportunities and attract large numbers of people. These include not just factory workers but also transport operators, shopkeepers, bank employees, doctors, teachers and other service providers. The Kobe-Osaka region of Japan is thickly populated because of the presence of a number of industries.

III. Social and Cultural Factors

- Some places attract more people because they have religious or cultural significance. In the same way – people tend to move away from places where there is social and political unrest.

Q.82) Which of the following are the components of Population Change?

1. Crude birth rate
2. Crude death rate
3. Sex Ratio
4. Migration

Choose the correct answer from the codes given below:

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

Q.82) Solution (d)

Components of Population Change:

There are three components of population change –

- Births
- Deaths
- Migration

The crude birth rate (CBR) is expressed as number of live births in a year per thousand of population.

Death rate plays an active role in population change.

Population growth occurs not only by increasing births rate but also due to decreasing death rate.

Crude Death Rate (CDR) is a simple method of measuring mortality of any area. CDR is expressed in terms of number of deaths in a particular year per thousand of population in a particular region.

Migration: Apart from birth and death there is another way by which the population size changes. When people move from one place to another, the place they move from is called the Place of Origin and the place they move to is called the Place of Destination. The place of origin shows a decrease in population while the population increases in the place of destination. Migration may be interpreted as a spontaneous effort to achieve a better balance between population and resources.

Q.83) Which of the following are the push factors of Migration?

1. Political Unrest
2. Better job opportunities
3. Socio-economic backwardness

Choose the correct answer from the codes given below:

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

Q.83) Solution (b)

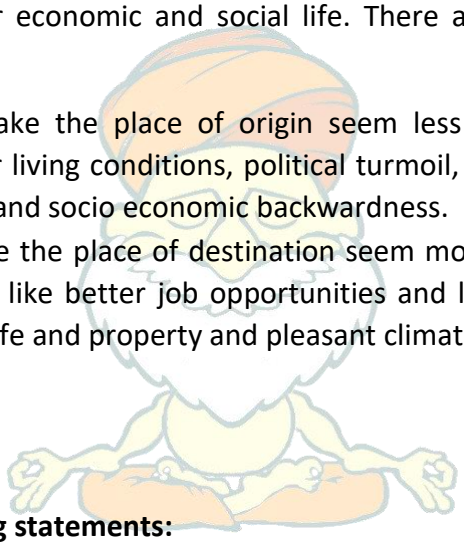
Human migration involves the movement of people from one place to another with intentions of settling, permanently or temporarily, at a new location (geographic region).

Migration is often associated with better human capital at both individual and household level, and with better access to migration networks.

Migration may be permanent, temporary or seasonal. It may take place from rural to rural areas, rural to urban areas, urban to urban areas and urban to rural areas.

People migrate for a better economic and social life. There are two sets of factors that influence migration:

- The Push factors make the place of origin seem less attractive for reasons like unemployment, poor living conditions, political turmoil, unpleasant climate, natural disasters, epidemics and socio economic backwardness.
- The Pull factors make the place of destination seem more attractive than the place of origin for reasons like better job opportunities and living conditions, peace and stability, security of life and property and pleasant climate.



Q.84) Consider the following statements:

1. Proportion of literate population of a country in an indicator of its socio-economic development.
2. The pattern of sex ratio is an indicator of the development of a region.

Which of the above statements is/are correct?

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

Q.84) Solution (a)

Literacy:

- Proportion of literate population of a country in an indicator of its socio-economic development as it reveals the standard of living, social status of females, availability of educational facilities and policies of government.
- Level of economic development is both a cause and consequence of literacy. In India – literacy rate denotes the percentage of population above 7 years of age, who is able to read, write and have the ability to do arithmetic calculations with understanding.

Sex Ratio:

- The number of women and men in a country is an important demographic characteristic. The ratio between the number of women and men in the population is called the Sex Ratio.
- In regions where gender discrimination is rampant, the sex ratio is bound to be unfavourable to women. Such areas are those where the practice of female foeticide, female infanticide and domestic violence against women are prevalent.
- More women in the population does not mean they have a better status. It could be that the men might have migrated to other areas for employment.
- The world pattern of sex ratio does not exhibit variations in the developed regions of the world.
- In general, Asia has a low sex ratio. Countries like China, India, Saudi Arabia, Pakistan, Afghanistan have a lower sex ratio.
- On the other extreme is greater part of Europe (including Russia) where males are in minority. A deficit of males in the populations of many European countries is attributed to better status of women, and an excessively male-dominated out-migration to different parts of the world in the past. Thus sex ratio is not an indicator of development of a region.

Q.85) Which of the following concepts are the pillars of human development?

1. Gross Domestic Product
2. Equity
3. Sustainability
4. Productivity
5. Empowerment

Choose the correct answer from the codes given below:

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

Q.85) Solution (c)

The concept of human development was introduced by Dr Mahbub-ul-Haq. Dr Haq has described human development as development that enlarges people's choices and improves their lives. People are central to all development under this concept. These choices are not fixed but keep on changing. The basic goal of development is to create conditions where people can live meaningful lives.

The idea of human development is supported by the concepts of equity, sustainability, productivity and empowerment.

- Equity refers to making equal access to opportunities available to everybody. The opportunities available to people must be equal irrespective of their gender, race, income and in the Indian case, caste. Yet this is very often not the case and happens in almost every society.
- Sustainability means continuity in the availability of opportunities. To have sustainable human development, each generation must have the same opportunities. All environmental, financial and human resources must be used keeping in mind the future. Misuse of any of these resources will lead to fewer opportunities for future generations.
- Productivity here means human labour productivity or productivity in terms of human work. Such productivity must be constantly enriched by building capabilities in people. Ultimately, it is people who are the real wealth of nations. Therefore, efforts to increase their knowledge, or provide better health facilities ultimately leads to better work efficiency.
- Empowerment means to have the power to make choices. Such power comes from increasing freedom and capability. Good governance and people-oriented policies are required to empower people. The empowerment of socially and economically disadvantaged groups is of special importance.

Gross Domestic Product (GDP) is an indicator of economic growth of a nation. GDP merely measures the size of a nation's economy and doesn't reflect a nation's welfare.

Q.86) Which of the following are the indicators on the basis of which Human Development Index is prepared by the United Nations Development Program?

1. Life expectancy at birth
2. Mean of years of schooling for adults aged 25 years and more
3. Per Capita Gross National Income
4. Per capita consumption expenditure

Choose the correct answer from the codes given below:

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

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

Q.86) Solution (a)

The HDI was created to emphasize that people and their capabilities should be the ultimate criteria for assessing the development of a country, not economic growth alone.

The Human Development Index (HDI) is a summary measure of average achievement in key dimensions of human development: a long and healthy life, being knowledgeable and have a decent standard of living.

The HDI is the geometric mean of normalized indices for each of the three dimensions.

- The health dimension is assessed by life expectancy at birth
- The education dimension is measured by mean of years of schooling for adults aged 25 years and more and expected years of schooling for children of school entering age.
- The standard of living dimension is measured by gross national income per capita.

The HDI simplifies and captures only part of what human development entails. It does not reflect on inequalities, poverty, human security, empowerment, etc.

Q.87) The "Central Place Theory" is related to:

a) Poverty
b) Urbanization
c) Sex Ratio
d) Literacy

Q.87) Solution (b)

Central Place Theory (CPT) is a spatial theory in urban geography and urban economics. CPT explains the spatial arrangements, patterns and distribution of urban areas and human settlements.

Central place theory was given by Walter Christaller in 1933 on the basis of settlement patterns in southern Germany.

The primary purpose of a settlement or market town, according to central-place theory, is the provision of goods and services for the surrounding market area.

The fundamental concepts on which the central place theory is based are:

- Principle of centralization : The small settlements are organized around a larger settlement which serves as a focal point for all settlements around it.
- Principle of hierarchy : The settlements are arranged in a hierarchical fashion for e.g. the state, district and tehsil form an administrative territorial hierarchy.

The concept of a central place: A central place is a settlement which serves as a focal point for number of other settlements which are dependent on it. It has two concepts attached to it - range of goods and threshold. The range of goods refers to the maximum distance from the complementary area that a person is willing to travel for certain goods in the central place. The threshold refers to the minimum customers required for a service to be profitable at the central place.

Q.88) Which of the following are the initiatives taken by the Government of India aimed at urban planning and management?

1. AMRUT
2. HRIDAY
3. SVAMITVA

Choose the correct answer from the codes given below:

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

Q.88) Solution (b)

Atal Mission for Rejuvenation and Urban Transformation (AMRUT):

The purpose of Atal Mission for Rejuvenation and Urban Transformation (AMRUT) is to:

- Ensure that every household has access to a tap with the assured supply of water and a sewerage connection.
- Increase the amenity value of cities by developing greenery and well maintained open spaces (e.g. parks) and
- Reduce pollution by switching to public transport or constructing facilities for non-motorized transport (e.g. walking and cycling). All these outcomes are valued by citizens, particularly women, and indicators and standards have been prescribed by the Ministry of Housing and Urban Affairs (MoHUA) in the form of Service Level Benchmarks (SLBs).

Heritage City Development and Augmentation Yojana (HRIDAY):

- It is a central sector scheme of the Government of India, launched with the aim of bringing together urban planning, economic growth and heritage conservation in an inclusive manner & with the objective of preserving the heritage character of the City.

- Under the Scheme, twelve cities namely, Ajmer, Amritsar, Amaravati, Badami, Dwarka, Gaya, Kanchipuram, Mathura, Puri, Varanasi Velankanni, Warangal have been identified for development.

Survey of Villages Abadi and Mapping with Improvised Technology In Village Areas (SVAMITVA):

- The scheme aims to provide an integrated property validation solution for rural India. The demarcation of rural abadi areas would be done using Drone Surveying technology.
- This would provide the 'record of rights' to village household owners possessing houses in inhabited rural areas in villages which, in turn, would enable them to use their property as a financial asset for taking loans and other financial benefits from Bank.

Q.89) In which one of the following regions extensive commercial grain cultivation is practised?

1. Pampas of Argentina
2. European Steppes
3. Amazon Basin

Choose the correct answer from the codes given below:

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

Q.89) Solution (a)

Extensive Commercial Grain Cultivation

- Commercial grain cultivation is practised in the interior parts of semi-arid lands of the midlatitudes. Wheat is the principal crop, though other crops like corn, barley, oats and rye are also grown.
- The size of the farm is very large, therefore entire operations of cultivation from ploughing to harvesting are mechanised.
- This type of agriculture is best developed in Eurasian steppes, the Canadian and American Prairies, the Pampas of Argentina, the Velds of South Africa, the Australian Downs and the Canterbury Plains of New Zealand.

Amazon Basin is the region where extensive commercial grain cultivation is not practised. Amazon Basin is the largest tropical forest in the world. People generally practice hunting and gathering and slash and burn agriculture here.

Q.90) Consider the following statements:

1. There is positive correlation between economic development and population growth.
2. 90 per cent of the world population lives in about 10 per cent of its land area.

Which of the above statements is/are correct?

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

Q.90) Solution (b)

Population growth in different parts of the world can be compared. The growth of population is low in developed countries as compared to developing countries. Thus, there is negative correlation between economic development and population growth.

Patterns of population distribution and density help us to understand the demographic characteristics of any area. The term population distribution refers to the way people are spaced over the earth's surface. Broadly, 90 per cent of the world population lives in about 10 per cent of its land area.

The 10 most populous countries of the world contribute about 60 per cent of the world's population. Of these 10 countries, 6 are located in Asia.

Q.91) Consider the following statements regarding dependency ratio:

1. Drop in Total Fertility Rate leads to higher dependency ratio.
2. Dependency Ratio is used to measure the pressure on the productive population.

Which of the above statements is/are correct?

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

Q.91) Solution (b)

The dependency ratio is an age-population ratio of those typically not in the labor force (the dependent part ages 0 to 14 and 65+) and those typically in the labor force (the productive part ages 15 to 64).

It is used to measure the pressure on the productive population.

A dropping Total Fertility Rate leads to lower dependency ratio, as there are fewer children below working age dependent on the working population.

Consideration of the dependency ratio is essential for governments, economists, bankers, business, industry, universities and all other major economic segments which can benefit from understanding the impacts of changes in population structure.

A low dependency ratio means that there are sufficient people working who can support the dependent population. A lower ratio could allow for better pensions and better health care for citizens. A higher ratio indicates more financial stress on working people and possible political instability.

While the strategies of increasing fertility and of allowing immigration especially of younger working age people have been formulas for lowering dependency ratios, future job reductions through automation may impact the effectiveness of those strategies.

Q.92) Which of the following factors influence the exploitation of mineral resources in the world?

1. Grade of the Ore
2. Size of Deposit
3. Method of Mining

Choose the correct answer from the codes given below:

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

Q.92) Solution (d)

Major factors affecting exploitation of mineral resources in the world are as follows:

- Richness or Grade of the Ore: The abundance or otherwise the absence of minerals determines in a large measure their commercial exploitation. Ores vary in their metal content. Generally the higher-grade ores are more economic to work, not only because they yield large amount of metal but also because their higher metal content makes them easier and cheaper to smelt. Minerals of high value such as gold, diamonds, copper, uranium, can often be mined at very high cost, because they are in great demand and fetch high prices.
- Size of Deposit: The size of deposit is important because mining requires a large amount of expensive equipment. It will not be worthwhile to provide such equipment to work a deposit which will run out in some months. Small- scale working is only profitable for precious minerals. Sometimes, small deposits may be worked out profitably where transport cost is low.
- Method of Mining: The method of mining depends on the mode of occur-rence of the ores. The open-cast mining is the cheapest, while shaft mines are very expensive.

The cost of mining also depends on the scale of operations. If the mining has been done at a large scale, the capital and running costs can be offset.

- Accessibility: The accessibility of a region where the particular mineral deposit occurs is of great significance. The terrain and climate determine accessibility which helps or hinders the mining operations.
- Transportation Facilities: For a successful mining transportation facilities are very essential. Not only for the mining but it is also necessary for mined ores to be transported at the sites of their use. Ores are relatively bulky and heavy. They are thus costly to transport and the shorter the distance to be covered the better. The deposits having coastal location or located near industrial sites have an advantage over those far inland.
- Technology: Technological changes pertaining to mining methods, manufac-turing processes and the like may change once worthless deposits are converted into esteemed commercial ores. The technique of geological survey has now been changed. With the help of remote sensing techniques, one is able to estimate the reserves of mineral resources of a region.

Q.93) Which of the following agricultural practice follow monoculture?

1. Mixed farming
2. Dairy farming
3. Plantation agriculture

Choose the correct answer from the codes given below:

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

Q.93) Solution (d)

Monoculture is the agricultural practice of growing a single crop, plant, or livestock species, variety, or breed in a field or farming system at a time. It has allowed farmers to increase efficiency in planting, managing, and harvesting but it can also increase the risk of diseases or pest outbreaks.

In crop monocultures, each plant in a field has the same standardized planting, maintenance and harvesting requirements resulting in greater yields and lower costs. When a crop is matched to its well-managed environment, a monoculture can produce higher yields than a polyculture.

Dairy Farming: Dairy is the most advanced and efficient type of rearing of milch animals. It is highly capital intensive. Animal sheds, storage facilities for fodder, feeding and milching

machines add to the cost of dairy farming. Special emphasis is laid on cattle breeding, health care and veterinary services.

Plantation Agriculture: The characteristic features of this type of farming are large estates or plantations, large capital investment, managerial and technical support, scientific methods of cultivation, single crop specialisation, cheap labour, and a good system of transportation which links the estates to the factories and markets for the export of the products.

Mixed Farming: Mixed farming is a type of farming which involves both the growing of crops and the raising of livestock. The cultivation of crops alongside the rearing of animals for meat or eggs or milk defines mixed farming. For example, a mixed farm may grow cereal crops such as wheat or rye and also keep cattle, sheep, pigs or poultry. Often the dung from the cattle serves to fertilize the cereal crops.

Mixed farming does not follow monoculture while dairy farming and plantation agriculture involves monoculture.

Q.94) Which of the following industries can be categorised as footloose industry?

1. Cotton
2. Sugar
3. Honey processing

Choose the correct answer from the codes given below:

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

Q.94) Solution (c)

Footloose industry is a general term for an industry that can be placed and located at any location without effect from factors of production such as resources, land, labour, and capital.

These industries often have spatially fixed costs, which means that the costs of the products do not change despite where the product is assembled. Diamonds, computer chips, and mobile manufacturing are some examples of footloose industries.

Footloose industries can also refer to the processing of products that are neither weight-gaining, nor weight-losing, and face significant transportation costs. An example of a footloose processing industry is honey. The weight of the raw honey and wax is the same as the finishing product. So, whether the honey is processed near the source of the raw materials or at the location of the final product demand, the transportation costs are the same.

Q.95) Consider the following statements regarding Quinary Activities:

1. It is defined as jobs that involve high degrees and high level of innovations.
2. It is often referred as gold collar profession.

Which of the above statements is/are correct?

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

Q.95) Solution (c)

The highest level of decision makers or policy makers performs quinary activities. These are subtly different from the knowledge based industries that the quinary sector in general deals with.

Quinary activities are services that focus on the creation, re-arrangement and interpretation of new and existing ideas; data interpretation and the use and evaluation of new technologies. Often referred to as 'gold collar' professions, they represent another subdivision of the tertiary sector representing special and highly paid skills of senior business executives, government officials, research scientists, financial and legal consultants, etc. Their importance in the structure of advanced economies far outweighs their numbers.

Q.96) Which one of the following activities is/are related to quaternary sector?

1. University teaching
2. Manufacturing computers
3. Printing books

Choose the correct answer from the codes given below?

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

Q.96) Solution (a)

The quaternary sector of the economy is based upon the economic activity that is associated with either the intellectual or knowledge-based economy.

Quaternary activities involve some of the following: the collection, production and dissemination of information or even the production of information. Quaternary activities

centre around research, development and may be seen as an advanced form of services involving specialised knowledge and technical skills.

This consists of information technology; media; research and development; information-based services such as information-generation and information-sharing; and knowledge-based services such as consultation, education, financial planning, blogging, and designing.

The Quaternary Sector along with the Tertiary Sector has replaced most of the primary and secondary employment as the basis for economic growth. Over half of all workers In developed economies are in the 'Knowledge Sector' and there has been a very high growth in demand for and consumption of information based services from mutual fund managers to tax consultants, software developers and statisticians. Personnel working in office buildings, elementary schools and university classrooms, hospitals and doctors' offices, theatres, accounting and brokerage firms all belong to this category of services.

Like some of the tertiary functions, quaternary activities can also be outsourced. They are not tied to resources, affected by the environment, or necessarily localised by market.

Q.97) The "Malthus Theory" is related to:

a) Agglomeration economies
b) Digital divide
c) Demographic dividend
d) Population growth

Q.97) Solution (d)

Thomas Malthus was an 18th-century British philosopher and economist noted for the Malthusian growth model, an exponential formula used to project population growth.

The theory states that food production will not be able to keep up with growth in the human population, resulting in disease, famine, war, and calamity.

According to him "By nature human food increases in a slow arithmetical ratio; man himself increases in a quick geometrical ratio unless want and vice stop him. The increase in numbers is necessarily limited by the means of subsistence Population invariably increases when the means of subsistence increase, unless prevented by powerful and obvious checks."

The theory propounded by Malthus can be summed up in the following propositions:

- Food is necessary to the life of man and, therefore, exercises a strong check on population. In other words, population is necessarily limited by the means of subsistence (i.e., food).
- Population increases faster than food production. Whereas population increases in geometric progression, food production increases in arithmetic progression.

- Population always increases when the means of subsistence increase, unless prevented by some powerful checks.
- There are two types of checks which can keep population on a level with the means of subsistence. They are the preventive and a positive check.

Q.98) Consider the following statements regarding International Migration 2020 Highlight:

1. It is published by the International Labour Organization.
2. According to the report, the Indian diaspora is the largest in the world.
3. The United States is the largest country of destination of international migrants.

Which of the above statements is/are correct?

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

Q.98) Solution (d)

International Migration 2020 Highlight:

This report is published by United Nations Department of Economic and Social Affairs (UNDESA).

Highlights of the report:

- COVID-19 has disrupted all forms of human mobility through the closing of national borders and halting of travel worldwide.
- Two thirds of all international migrants live in just 20 countries.
- The United States of America remained the largest destination, hosting 51 million international migrants in 2020, equal to 18 per cent of the world's total.
- Germany hosted the second largest number of migrants worldwide, at around 16 million, followed by Saudi Arabia (13 million), the Russian Federation (12 million) and the United Kingdom (9 million).
- India topped the list of countries with the largest diasporas in 2020, with 18 million persons from India living outside of their country of birth.
- Other countries with a large transnational community included Mexico and the Russian Federation (11 million each), China (10 million) and Syria (8 million).
- In 2020, nearly half of all international migrants resided in the region from which they originated, with Europe accounting for the largest share of intra-regional migration: 70 per cent of migrants born in Europe reside in another European country.
- Nearly two thirds of all international migrants live in high-income countries.
- In 2020, refugees accounted for 12 per cent of all international migrants.

- Migrant women are catalysts of change, promoting positive social, cultural and political norms within their homes and throughout their communities.
- International migrants often make up a larger proportion of working-age persons compared to the national population.

Q.99) Consider the following statements:

1. Total Fertility Rate is the average number of children that would be born to a woman over her lifetime if she was to live from birth until the end of her reproductive life.
2. Total Fertility Rate of 2.2 is known as the replacement rate.

Which of the above statements is/are correct?

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

Q.99) Solution (a)

Total Fertility Rate (TFR) of a population is the average number of children that would be born to a woman over her lifetime if:

- she was to experience the exact current age-specific fertility rates (ASFRs) through her lifetime
- she was to live from birth until the end of her reproductive life

The TFR is not based on the fertility of any real group of women since this would involve waiting until they had completed childbearing. Nor is it based on counting up the total number of children actually born over their lifetime. Instead, the TFR is based on the age-specific fertility rates of women in their "child-bearing years", which in conventional international statistical usage is ages 15–44 or 15–49.

Replacement rates:

- Replacement fertility is the total fertility rate at which women give birth to enough babies to sustain population levels.
- According to the UN Population Division, a total fertility rate (TFR) of about 2.1 children per woman is called replacement-level fertility.
- If replacement level fertility is sustained over a sufficiently long period, each generation will exactly replace itself.
- The replacement fertility rate is indeed only slightly above 2.0 births per woman for most industrialized countries (2.075 in the UK, for example), but ranges from 2.5 to 3.3 in developing countries because of higher mortality rates, especially child mortality

Q.100) Which of the following are the indicators on basis of which Global Hunger Index (GHI) is calculated?

1. Undernourishment
2. Child Wasting
3. Child Stunting
4. Child Mortality

Choose the correct answer from the codes given below:

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

Q.100) Solution (d)

The Global Hunger Index (GHI) is a tool that measures and tracks hunger globally as well as by region and by country. The GHI is calculated annually, and its results appear in a report issued in October each year.

The 2020 Global Hunger Index report presents a multi-dimensional measure of national, regional, and global hunger by assigning a numerical score based on several aspects of hunger.

The Global Hunger Index measures hunger on a 100-point scale, with 0 being the best score (no hunger) and 100 being the worst, although neither of these extremes is reached in practice.

The GHI combines 4 component indicators:

- the proportion of the undernourished as a percentage of the population;
- the proportion of children under the age of five suffering from wasting, a sign of acute undernutrition;
- the proportion of children under the age of five suffering from stunting, a sign of chronic undernutrition; and
- the mortality rate of children under the age of five.

India has been ranked at 94 among 107 countries in the Global Hunger Index (GHI) 2020. With a score of 27.2, India has a level of hunger that is "serious".

India features behind Nepal (73), Pakistan (88), Bangladesh (75), Indonesia (70) among others.

Out of the total 107 countries, only 13 countries fare worse than India including countries like Rwanda (97), Nigeria (98), Afghanistan (99), Liberia (102), Mozambique (103), Chad (107) among others.

Performance on the Indicators:

- Undernourishment: 14% of India's population is undernourished (2017-19). It was 16.3% during 2011-13.
- Child Wasting: 17.3% (2015-19), it was 15.1% in 2010-14.
- Child Stunting: 34.7%, it has improved significantly, from 54% in 2000 to less than 35% now.
- Child Mortality: 3.7%, it was 5.2% in 2012.

Q.101) Which of the following is/are correct regarding the Greater Himalayas?

1. It has an average height of 6000 metres
2. Pir Panjal is the prominent range of Greater Himalays.
3. It is the most continuous range

Choose the correct answer from the codes given below:

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

Q.101) Solution (d)

Himalayas are the young fold mountains. This is the highest mountain range of the world. Himalayas act as natural barrier. The extreme cold, snow and rugged topography discourage the neighbours to enter India through Himalayas. They run from west-east direction from Indus to Brahmaputra along the northern boundary of India covering a distance of 2500 km.

The Greater Himalayas or Himadari:

- The Greater Himalayas comprises of the northern most ranges and peaks.
- It has an average height of 6000 metres and width lies between 120 to 190 Kms .
- It is the most continuous range. It is snow bound and many glaciers descend from this range.
- It has high peaks like Mt. Everest, Kanchenjunga, Makalu, Dhaulagiri, Nanga Parbat etc. having a height of more than 8000 metres.
- Mt. Everest (8848 m) is the highest peak of the world and Kanchenjunga is the highest peak of Himalaya in India.
- High Mountain passes also exist in this range, namely, Bara Lacha-La, Shipki-La, Nathu-La, Zoji-La, Bomidi-La etc.
- The Ganga and Yamuna rivers originate from this Himalayas.

Q.102) Which of the following pairs is/are correctly matched?

(S.No.)	(Peaks)	(Part of)

1.	Pir Panjal range	Greater Himalayas
2.	Dhauladhar range	Lesser Himalayas
3.	Zanskar range	Trans-Himalayas

Choose the correct answer from the codes given below:

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

Q.102) Solution (b)

The Pir Panjal Rang is a group of mountains in the Lesser Himalayan region, running from east-southeast to west-northwest across the state of Himachal Pradesh, Jammu and Kashmir and the Pakistan administered Kashmir. Near the bank of the Sutlej River, it dissociates itself from the Himalayas and forms a divide between the Beas and Ravi rivers on one side and the Chenab on the other.

The Dhauladhar range is part of a lesser Himalayan chain of mountains. It rises from the Shivalik hills, to the north of Kangra and Mandi. Dharamsala, the headquarters of Kangra district and the winter capital of Himachal Pradesh, lies on its southern spur in the Kangra Valley, which divides it from Chamba.

Zanskar Range is part of Trans-Himalayas. The average height of the Zanskar Range is about 6,000 m. It separates Ladakh from the valleys of Kashmir and the Chenab River.

Q.103) Consider the following statements:

1. The general orientation of Himalayan ranges is from northwest to the southeast direction in the northeastern part of India.
2. Himalayas in the Darjiling and Sikkim regions lie in an eastwest direction.
3. In Arunachal Pradesh the Himalayas are from southwest to the northwest direction.

Which of the above statements is/are correct?

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

Q.103) Solution (d)

The Himalayas consist of a series of parallel mountain ranges.

- Some of the important ranges are the Greater Himalayan range, which includes:
    - The Great Himalayas and

  - The Trans-Himalayan range
  - The Middle Himalayas
  - The Shiwalik
- The general orientation of these ranges is from northwest to the southeast direction in the northwestern part of India.
- Himalayas in the Darjiling and Sikkim regions lie in an eastwest direction, while in Arunachal Pradesh they are from southwest to the northwest direction.
- In Nagaland, Manipur and Mizoram, they are in the northsouth direction.
- The approximate length of the Great Himalayan range, also known as the central axial range, is 2,500 km from east to west, and their width varies between 160-400 km from north to south.
- It is also evident from the map that the Himalayas stand almost like a strong and long wall between the Indian subcontinent and the Central and East Asian countries.
- Himalayas are not only the physical barrier, they are also a climatic, drainage and cultural divide.

Q.104) With reference to Northern Plains of India, consider the following statements:

1. The northern plains are formed by the alluvial deposits.
2. The region at the foothills of Shivalik is known as Khadar.
3. Bhangar plains comprise new alluvium.

Which of the above statements is/are correct?

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

Q.104) Solution (a)

The Northern Plains:

- The northern plains are formed by the alluvial deposits brought by the rivers – the Indus, the Ganga and the Brahmaputra.
- These plains extend approximately 3,200 km from the east to the west. The average width of these plains varies between 150-300 km.
- The maximum depth of alluvium deposits varies between 1,000-2,000 m. From the north to the south, these can be divided into three major zones: the Bhabar, the Tarai and the alluvial plains.
- The alluvial plains can be further divided into the Khadar and the Bhangar.
- Bhabar is a narrow belt ranging between 8-10 km parallel to the Shiwalik foothills at the break-up of the slope.

- As a result of this, the streams and rivers coming from the mountains deposit heavy materials of rocks and boulders, and at times, disappear in this zone.
- South of the Bhabar is the Tarai belt, with an approximate width of 10-20km where most of the streams and rivers re-emerge without having any properly demarcated channel, thereby, creating marshy and swampy conditions known as the Tarai.
- This has a luxurious growth of natural vegetation and houses a varied wild life.
- The south of Tarai is a belt consisting of old and new alluvial deposits known as the Bhangar and Khadar respectively.
- These plains have characteristic features of mature stage of fluvial erosional and depositional landforms such as sand bars, meanders, oxbow lakes and braided channels. The Brahmaputra plains are known for their riverine islands and sand bars.
- Most of these areas are subjected to periodic floods and shifting river courses forming braided streams.

Q.105) Which of the following statements is/are correct regarding the Deccan Plateau?

1. It is bordered by the the Satpura, Maikal range and Mahadeo hills in the north.
2. Eastern Ghats are comparatively higher in elevation and more continuous than the Western Ghats.
3. Most of the Peninsular Rivers have their origin in the Western Ghats.

Choose the correct answer from the codes given below:

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

Q.105) Solution (c)

The Deccan Plateau:

- This is bordered by the Western Ghats in the west, Eastern Ghats in the east and the Satpura, Maikal range and Mahadeo hills in the north.
- Western Ghats are locally known by different names such as Sahyadri in Maharashtra, Nilgiri hills in Karnataka and Tamil Nadu and Anaimalai hills and Cardamom hills in Kerala.
- Western Ghats are comparatively higher in elevation and more continuous than the Eastern Ghats.
- Their average elevation is about 1,500 m with the height increasing from north to south.
- 'Anaimudi' (2,695 m), the highest peak of Peninsular plateau is located on the Anaimalai hills of the Western Ghats followed by Dodabetta (2,637 m) on the Nilgiri hills.

- Most of the Peninsular Rivers have their origin in the Western Ghats.
- Eastern Ghats comprising the discontinuous and low hills are highly eroded by the rivers such as the Mahanadi, the Godavari, the Krishna, the Kaveri, etc.
- Some of the important ranges include the Javadi hills, the Palconda range, the Nallamala hills, the Mahendragiri hills, etc.
- The Eastern and the Western Ghats meet each other at the Nilgiri hills.

Q.106) Consider the following statements:

1. The Satpura range is a series of young fold mountains.
2. The Peninsular plateau extends upto Rajasthan.
3. Rajmahal hills is an extension of the Central Highlands.

Which of the above statements is/are correct?

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

Q.106) Solution (d)

The Central Highlands:

- They are bounded to the west by the Aravali range.
- The Satpura range is formed by a series of scarped plateaus on the south, generally at an elevation varying between 600-900 m above the mean sea level. This forms the northernmost boundary of the Deccan plateau. It is a classic example of the relict mountains which are highly denuded and form discontinuous ranges.
- The extension of the Peninsular plateau can be seen as far as Jaisalmer in the West, where it has been covered by the longitudinal sand ridges and crescent-shaped sand dunes called barchans.
- This region has undergone metamorphic processes in its geological history, which can be corroborated by the presence of metamorphic rocks such as marble, slate, gneiss, etc.
- The general elevation of the Central Highlands ranges between 700-1,000 m above the mean sea level and it slopes towards the north and northeastern directions.
- Most of the tributaries of the river Yamuna have their origin in the Vindhyan and Kaimur ranges.
- Banas is the only significant tributary of the river Chambal that originates from the Aravalli in the west.
- An eastern extension of the Central Highland is formed by the Rajmahal hills, to the south of which lies a large reserve of mineral resources in the Chotanagpur plateau.

Q.107) Consider the following statements regarding Northeastern plateau:

1. The North-eastern Plateau was separated from Peninsular Plateau at the time of origin of the Himalayas.
2. The Meghalaya Plateau receives maximum rainfall from the south east monsoon.

Which of the above statements is/are correct?

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

Q.107) Solution (a)

The Northeastern Plateau:

- It is an extension of the main Peninsular plateau.
- It is believed that due to the force exerted by the northeastward movement of the Indian plate at the time of the Himalayan origin, a huge fault was created between the Rajmahal hills and the Meghalaya plateau. Later, this depression got filled up by the deposition activity of the numerous rivers.
- Today, the Meghalaya and Karbi Anglong plateau stand detached from the main Peninsular Block.
- The Meghalaya plateau is further sub-divided into three: (i) The Garo Hills; (ii) The Khasi Hills; (iii) The Jaintia Hills, named after the tribal groups inhabiting this region.
- An extension of this is also seen in the Karbi Anglong hills of Assam.
- Similar to the Chotanagpur plateau, the Meghalaya plateau is also rich in mineral resources like coal, iron ore, sillimanite, limestone and uranium.
- This area receives maximum rainfall from the south west monsoon.
- As a result, the Meghalaya plateau has a highly eroded surface. Cherrapunji displays a bare rocky surface devoid of any permanent vegetation cover.

Q.108) Consider the following statements regarding the Indian Desert:

1. Most of the rivers in this region are ephemeral.
2. Mushroom rock is an important landform found in this region.
3. This region is mostly covered by Barchans.

Which of the above statements is/are correct?

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

Q.108) Solution (d)

The Indian Desert

- To the northwest of the Aravali hills lies the Great Indian desert. It is a land of undulating topography dotted with longitudinal dunes andbarchans.
- This region receives low rainfall below 150 mm per year; hence, it has arid climate with low vegetation cover.
- It is because of these characteristic features that this is also known as Marusthali.
- It is believed that during the Mesozoic era, this region was under the sea. This can be corroborated by the evidence available at wood fossils park at Aakal and marine deposits around Brahmsar, near Jaisalmer (The approximate age of the woodfossils is estimated to be 180 million years).
- Though the underlying rock structure of the desert is an extension of the Peninsular plateau, yet, due to extreme arid conditions, its surface features have been carved by physical weathering and wind actions.
- Some of the well pronounced desert land features present here are mushroom rocks, shifting dunes and oasis (mostly in its southern part).
- On the basis of the orientation, the desert can be divided into two parts: the northern part is sloping towards Sindh and the southern towards the Rann of Kachchh.
- Most of the rivers in this region are ephemeral. Ephermal River means which last for very short time.
- The Luni river flowing in the southern part of the desert is of some significance.
- Low precipitation and high evaporation makes it a water deficit region.
- There are some streams which disappear after flowing for some distance and present a typical case of inland drainage by joining a lake or playa.
- The lakes and the playas have brackish water which is the main source of obtaining salt.
- Barchans (crescent-shaped dunes) cover larger areas but longitudinal dunes become more prominent near the Indo-Pakistan boundary.

Q.109) Consider the following statements:

1. The eastern coastal plains are an example of submerged coastal plain.
2. The rivers flowing through this western coastal plain do not form any delta.
3. The emergent nature of coast makes it difficult for the development of good ports and harbours.

Which of the above statements is/are correct?

a) 1 and 2 only

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

Q.109) Solution (b)

The Coastal Plains:

- On the basis of the location and active geomorphological processes, it can be broadly divided into two: (i) the western coastal plains; (ii) the eastern coastal plains.
- The western coastal plains are an example of submerged coastal plain. It is believed that the city of Dwaraka which was once a part of the Indian mainland situated along the west coast is submerged under water.
- Because of this submergence it is a narrow belt and provides natural conditions for the development of ports and harbours.
- Kandla, Mazagaon, JLN port Navha Sheva, Marmagao, Mangalore, Cochin, etc. are some of the important natural ports located along the west coast.
- Extending from the Gujarat coast in the north to the Kerala coast in the south, the western coast may be divided into following divisions – the Kachchh and Kathiawar coast in Gujarat, Konkan coast in Maharashtra, Goan coast and Malabar coast in Karnataka and Kerala respectively.
- The western coastal plains are narrow in the middle and get broader towards north and south.
- The rivers flowing through this coastal plain do not form any delta.
- The Malabar coast has got certain distinguishing features in the form of 'Kayals' (backwaters), which are used for fishing, inland navigation and also due to its special attraction for tourists
- As compared to the western coastal plain, the eastern coastal plain is broader and is an example of an emergent coast.
- There are well developed deltas here, formed by the rivers flowing eastward in to the Bay of Bengal. These include the deltas of the Mahanadi, the Godavari, the Krishna and the Kaveri.
- Because of its emergent nature, it has less number of ports and harbours.
- The continental shelf extends up to 500 km into the sea, which makes it difficult for the development of good ports and harbours.

Q.110) Consider the following statements:

1. The Andaman Islands are separated from the Nicobar Islands by eleven degree channel.
2. The Amini Island is separated from the Canannore Island by ten degree channel.
3. Ritchie's archipelago is a group of islets in the Bay of Bengal.

Which of the above statements is/are correct?

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

Q.110) Solution (c)

The Islands:

- There are two major island groups in India – one in the Bay of Bengal and the other in the Arabian Sea.
- The Bay of Bengal island groups consist of about 572 islands/islets. These are situated roughly between 6°N-14°N and 92°E -94°E.
- The two principal groups of islets include the Ritchie's archipelago and the Labrynth Island.
- The entire group of island is divided into two broad categories – the Andaman in the north and the Nicobar in the south. They are separated by a water body which is called the Ten degree channel.
- It is believed that these islands are an elevated portion of submarine mountains.
- However, some smaller islands are volcanic in origin. Barren Island, the only active volcano in India is also situated in the Nicobar Islands.
- The coastal line has some coral deposits, and beautiful beaches.
- These islands receive convectional rainfall and have an equatorial type of vegetation.
- The islands of the Arabian Sea include Lakshadweep and Minicoy. These are scattered between 8°N-12°N and 71°E -74°E longitude.
- These islands are located at a distance of 280 km-480 km off the Kerala coast. The entire island group is built of coral deposits.
- There are approximately 36 islands of which 11 are inhabited. Minicoy is the largest island with an area of 453 sq. km.
- The entire group of islands is broadly divided by the Eleventh degree channel, north of which is the Amini Island and to the south of the Canannore Island.
- The Islands of this archipelago have storm beaches consisting of unconsolidated pebbles, shingles, cobbles and boulders on the eastern seaboard.

Q.111) Consider the following statements:

1. The rivers originating from the Amarkantak range shows radial drainage pattern.
2. Rivers originating from Chotanagpur plateau shows trellis drainage pattern.
3. Rivers of Peninsular India shows Antecedent drainage pattern.

Which of the above statements is/are correct?

a) 1 only

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

Q.111) Solution (b)

When the rivers originate from a hill and flow in all directions, the drainage pattern is known as 'radial'. The rivers originating from the Amarkantak range present a good example of it.

When the primary tributaries of rivers flow parallel to each other and secondary tributaries join them at right angles, the pattern is known as 'trellis'. Rivers originating from Chotanagpur plateau shows trellis drainage pattern.

Peninsular rivers show consequent drainage pattern which is when the rivers follow the general direction of slope.

Q.112) Which of the following landforms are formed by the rivers of Himalayan drainage system?

1. Graded valleys
2. Georges
3. Braided channels

Choose the correct answer from the codes given below:

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

Q.112) Solution (d)

The Himalayan Drainage System:

- The Himalayan drainage system has evolved through a long geological history. It mainly includes the Ganga, the Indus and the Brahmaputra river basins.
- Since these are fed both by melting of snow and precipitation, rivers of this system are perennial.
- These rivers pass through the giant gorges carved out by the erosional activity carried on simultaneously with the uplift of the Himalayas.
- Besides deep gorges, these rivers also form V-shaped valleys, rapids and waterfalls in their mountainous course.
- While entering the plains, they form depositional features like flat valleys, ox-bow lakes, flood plains, braided channels, and deltas near the river mouth.
- In the Himalayan reaches, the course of these rivers is highly tortuous, but over the plains they display a strong meandering tendency and shift their courses frequently.

- River Kosi, also known as the 'sorrow of Bihar', has been notorious for frequently changing its course. The Kosi brings huge quantity of sediments from its upper reaches and deposits it in the plains. The course gets blocked, and consequently, the river changes its course.

Q.113) Consider the following statements:

1. The Potwar Plateau acts as a water divide between the Indus and Ganga drainage systems.
2. The downthrusting of the Malda gap area between the Rajmahal hills and the Meghalaya plateau diverted the Brahmaputra drainage system to flow towards the Bay of Bengal.

Which of the above statements is/are correct?

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

Q.113) Solution (c)

Evolution of the Himalayan Drainage:

- There is difference of opinion about the evolution of the Himalayan rivers. However, geologists believe that a mighty river called Shiwalik or Indo-Brahma traversed the entire longitudinal extent of the Himalaya from Assam to Punjab and onwards to Sind, and finally discharged into the Gulf of Sind near lower Punjab during the Miocene period some 5-24 million years ago
- The remarkable continuity of the Shiwalik and its lacustrine origin and alluvial deposits consisting of sands, silt, clay, boulders and conglomerates support this viewpoint.
- It is opined that in due course of time Indo– Brahma river was dismembered into three main drainage systems:
    - The Indus and its five tributaries in the western part;
    - The Ganga and its Himalayan tributaries in the central part; and
    - The stretch of the Brahmaputra in Assam and its Himalayan tributaries in the eastern part.
- The dismemberment was probably due to the Pleistocene upheaval in the western Himalayas, including the uplift of the Potwar Plateau (Delhi Ridge), which acted as the water divide between the Indus and Ganga drainage systems.

- Likewise, the downthrusting of the Malda gap area between the Rajmahal hills and the Meghalaya plateau during the mid-pleistocene period diverted the Ganga and the Brahmaputra systems to flow towards the Bay of Bengal.

Q.114) Consider the following statements regarding Indus river system:

1. Khurram, Gomal and Viboa are the tributaries of Indus River.
2. The Jhelum is the largest tributary of the Indus River.
3. The Chenab is an antecedent river.

Which of the above statements is/are correct?

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

Q.114) Solution (a)

Indus River System:

- The Indus also known as the Sindhu, is the westernmost of the Himalayan rivers in India. It originates from a glacier near Bokhar Chu (31°15' N latitude and 81°40' E longitude) in the
- Tibetan region at an altitude of 4,164 m in the Kailash Mountain range. In Tibet, it is known as 'Singi Khamban; or Lion's mouth.
- The Indus receives a number of Himalayan tributaries such as the Shyok, the Gilgit, the Zaskar, the Hunza, the Nubra, the Shigar, the Gasting and the Dras. It finally emerges out of the hills near Attock where it receives the Kabul river on its right bank.
- The other important tributaries joining the right bank of the Indus are the Khurram, the Tochi, the Gomal, the Viboa and the Sangar.
- They all originate in the Sulaiman ranges. The river flows southward and receives 'Panjnad' a little above Mithankot.
- The Panjnad is the name given to the five rivers of Punjab, namely the Satluj, the Beas, the Ravi, the Chenab and the Jhelum.
- The Chenab is the largest tributary of the Indus. It is formed by two streams, the Chandra and the Bhaga, which join at Tandi near Keylong in Himachal Pradesh. Hence, it is also known as Chandrabhaga. The river flows for 1,180 km before entering into Pakistan. It is not an antecedent River.

Q.115) With reference to the river system of India, consider the following statements:

1. Ghaghara River rises in the Nepal Himalayas between the Dhaulagiri and Mount Everest.
2. Tila, Seti and Beri are tributaries of the Gandak River.
3. The Kosi is an antecedent river.

Which of the above statements is/are correct?

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

Q.115) Solution (c)

Gandak River:

- The Gandak comprises two streams, namely Kaligandak and Trishulganga.
- It rises in the Nepal Himalayas between the Dhaulagiri and Mount Everest and drains the central part of Nepal.
- It enters the Ganga plain in Champaran district of Bihar and joins the Ganga at Sonpur near Patna.

Ghaghara River:

- The Ghaghara originates in the glaciers of Mapchachungo.
- After collecting the waters of its tributaries – Tila, Seti and Beri, it comes out of the mountain, cutting a deep gorge at Shishapani.
- The river Sarda (Kali or Kali Ganga) joins it in the plain before it finally meets the Ganga at Chhapra.

Kosi River:

- The Kosi is an antecedent river with its source to the north of Mount Everest in Tibet, where its main stream Arun rises.
- After crossing the Central Himalayas in Nepal, it is joined by the Son Kosi from the West and the Tamur Kosi from the east. It forms Sapt Kosi after uniting with the river Arun.
- An antecedent stream is a stream that maintains its original course and pattern despite the changes in underlying rock topography.

Q.116) Which of the following geological events in the past have shaped the present drainage systems of Peninsular India?

1. Subsidence of the western flank of the Peninsula.
2. Upheaval of the Himalayas.
3. Slight tilting of the Peninsular block from northwest to the southeastern direction.

Choose the correct answer from the codes given below:

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

Q.116) Solution (d)

The Evolution of Peninsular Drainage System

Three major geological events in the distant past have shaped the present drainage systems of Peninsular India:

1. Subsidence of the western flank of the Peninsula leading to its submergence below the sea during the early tertiary period. Generally, it has disturbed the symmetrical plan of the river on either side of the original watershed.
2. Upheaval of the Himalayas when the northern flank of the Peninsular block was subjected to subsidence and the consequent trough faulting. The Narmada and The Tapi flow in trough faults and fill the original cracks with their detritus materials. Hence, there is a lack of alluvial and deltaic deposits in these rivers.
3. Slight tilting of the Peninsular block from northwest to the southeastern direction gave orientation to the entire drainage system towards the Bay of Bengal during the same period.

Q.117) Which of the following is/are west flowing peninsular rivers?

1. Subarnrekha
2. Bharathapuzha
3. Periyar

Choose the correct answer from the codes given below:

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

Q.117) Solution (d)

The rivers flowing towards the Arabian Sea have short courses.

Bharathappuzha:

- It rises near Annamalai hills.
- It is also known as Ponnani.
- It drains an area of 5,397 sq. km.
- It is an interstate river which flows through Kerala and Tamil Nadu.

- It flows westward through Palakkad Gap (most prominent discontinuity in the western ghats) and drains into the Arabian Sea.
- Malampuzha dam is the largest among the reservoirs built across Bharathapuzha and its tributaries.

Periyar:

- It is a perennial river and is used for supplying drinking water to the state.
- It originates from Sivagiri Hills of Western Ghats and flows through Periyar National Park and reaches the Periyar Lake, and then the water flows into Vembanad Lake and finally into Arabian Sea.
- The Idukki Dam on the Periyar generates a significant proportion of Kerala's electrical power.

Subernrekha:

- The Subarnarekha River flows through the states of Jharkhand, West Bengal and Odisha.
- The Subarnarekha originates from the Ranchi Plateau in Jharkhand forming the boundary between West Bengal and Odisha in its lower course.
- It joins Bay of Bengal forming an estuary between the Ganga and Mahanadi deltas. Its total length is 395 km.

Q.118) Which of the following rivers was known by the name Kanakanadini, Chitropala and Nilopala?

a) Narmada
b) Kaveri
c) Mahanadi
d) Krishna

Q.118) Solution (c)

Mahanadi River:

- The Mahanadi is a major river in East Central India.
- Mahanadi is also known for the Hirakud Dam, Gangrel Dam and Dhudhwa Dam.
- The river flows through the states of Chhattisgarh and Odisha.
- It is bounded by the Central India hills on the north, by the Eastern Ghats on the south and east, and by the Maikala range on the west.
- In different era, this river was known by several names, such as:
    - Ancient era – Kanaknandini
    - Dvapara Yuga – Chitrotpala (Similar name in matasya Purana)
    - Treta Yuga – Nilotpala (Similar name in vayu Purana)
    - Mahabharata era – Mahananda

- Kali Yuga – Mahanadi or Mahashweta

Q.119) Which of the following pairs is/are correctly matched?

S.No.	Tributary	River
1.	Kolar	Krishna
2.	Harangi	Kaveri
3.	Pravara	Narmada

Choose the correct answer from the codes given below:

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

Q.119) Solution (b)

The Kolar is a right bank tributary of the Narmada River. It flows for a total length of 101 km, all of which is in the state of Madhya Pradesh. It arises in the Vindhya Range of Sehore district and flows in a south westerly direction to meet the Narmada near Nasrullahganj in the Sehore district of Madhya Pradesh.

Harangi is the left bank tributary of Kaveri River. The Harangi originates in the Pushpagiri Hills of Western Ghats in Kodagu, Karnataka. Heavy rainfall from the south-west monsoon is the source of water in the catchment area of Harangi River.

Pravara is the smallest of the major tributaries of Godavari River located in Maharashtra. Among the 7 major tributaries, it is the only tributary which originates in the Western Ghats akin to Godavari. Also, it is the only major tributary of Godavari to have both its source and confluence located within the same district - Ahmednagar.

Q.120) Mahan, Morana, Geur and Ramdia are the tributaries of which of the following river?

a) Banas
b) Ghaghar
c) Kanhar
d) Rihand

Q.120) Solution (d)

Rihand River:

- The Rihand River is a tributary of the Son River and flows through the states of Chhattisgarh and Uttar Pradesh. Its old name was Renu or Renuka.
- The Rihand rises from Matiranga hills, in the region south west of the Mainpat plateau.
- Principal tributaries of Rihand are the Mahan, the Morana (Morni), the Geur, the Gagar, the Gobri, the Piparkachar, the Ramdia and the Galphulla.
- The Rihand Dam was constructed across the Rihand River in Uttar Pradesh in 1962 for hydropower generation; the reservoir impounded behind the dam is called Govind Ballabh Pant Sagar.

Q.121) With reference to the difference between terrestrial and jovian planets, consider the following statements:

1. The atmosphere of jovian planets is composed mainly of carbon dioxide and nitrogen.
2. The core of the jovian planets is more dense than the terrestrial planets.

Which of the above statements is/are correct?

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

Q.121) Solution (b)

The planets in the solar system are divided into terrestrial and jovian planets. They are different in their position, composition and other features.

First of all, let us see what are the jovian and the terrestrial planets. Jupiter, Saturn, Uranus and Neptune are the jovian planets. Mercury, Venus and Earth are the terrestrial planets.

One of the main differences that can be seen between terrestrial and jovian planets, is their surfaces. While the terrestrial planets are made of solid surfaces, the jovian planets are made of gaseous surfaces.

Well, the jovian planets are less dense when compared to the terrestrial planets, because they are mainly composed of hydrogen gas. Moreover, the core of the jovian planets is more dense than the terrestrial planets.

While the atmosphere of terrestrial planets is composed mainly of carbon dioxide and nitrogen gases, hydrogen and helium gases are found in abundance in the atmosphere of jovian planets.

Q.122) Which of the following is/are related to the formation or modification of the present atmosphere of the Earth?

1. Solar Winds
2. Photosynthesis
3. Degassing

Choose the correct answer from the codes given below:

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

Q.122) Solution (d)

The present composition of earth's atmosphere is chiefly contributed by nitrogen and oxygen.

There are three stages in the evolution of the present atmosphere. The first stage is marked by the loss of primordial atmosphere.

In the second stage, the hot interior of the earth contributed to the evolution of the atmosphere.

Finally, the composition of the atmosphere was modified by the living world through the process of photosynthesis.

The early atmosphere, with hydrogen and helium, is supposed to have been stripped off as a result of the solar winds. This happened not only in case of the earth, but also in all the terrestrial planets, which were supposed to have lost their primordial atmosphere through the impact of solar winds.

During the cooling of the earth, gases and water vapour were released from the interior solid earth. This started the evolution of the present atmosphere. The early atmosphere largely contained water vapour, nitrogen, carbon dioxide, methane, ammonia and very little of free oxygen.

The process through which the gases were outpoured from the interior is called degassing. Continuous volcanic eruptions contributed water vapour and gases to the atmosphere.

Q.123) Consider the following statements:

1. Venus appears to be the third brightest object in the sky after the Sun and the Moon.
2. The high surface temperature of Venus is attributed to the greenhouse effect.
3. Venus spins on its axis from west to east.

Which of the above statements is/are correct?

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

Q.123) Solution (b)

Venus, nearest planetary neighbour of Earth, 40 million km away, has its surface hidden from view by a dense yellowish-white cloud, which extends to 80 km above the surface.

Venus appears to be the third brightest object in the sky after the Sun and the Moon, because of its short distance from us and because the white cloud reflects almost 76 per cent of the sunlight that falls on it. Venus appears so bright at times that, under ideal atmospheric conditions, it may be seen with the unaided eye in daytime.

The surface temperatures of Venus are around 480°C. The atmosphere of Venus is made up of 96 per cent carbon dioxide gas and clouds of sulphuric acid with small quantities of hydrochloric and hydrofluoric acid. There we small traces of water vapour nitrogen, argon, sulphur dioxide and carbon monoxide gases. The atmospheric pressure is 90 times the pressure we feel from the Earth's atmosphere.

The high surface temperature of Venus comes about through what is known as the greenhouse effect. Sunlight passes through the clouds and atmosphere of Venus, and reaches its surface. The surface on being heated gives out infrared radiations. The carbon dioxide in the atmosphere of Venus does not let the infrared radiation escape. Thus, the heat of the Sun is efficiently trapped with only very little being able to escape. As a result, the surface temperature rises.

Venus spins on its axis from east to west. Venus and Uranus is the exception to the counter-clockwise rotation of other planets of the solar system. They have what's known as retrograde rotation, spinning counter to the rotation of the Sun.

Q.124) Which of the following planets is/are part of Goldilocks Zone?

1. Venus
2. Mars
3. Earth

Choose the correct answer from the codes given below:

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

Q.124) Solution (c)

The Goldilocks Zone refers to the habitable zone around a star where the temperature is just right - not too hot and not too cold - for liquid water to exist on a planet.

Liquid water is essential for life as we know it. Where we find liquid water on Earth we also find life.

At present, Earth is the only planet in our Solar System having a Goldilock Zone.

The location of a Goldilocks Zone around another star depends on the type of star. Bigger hotter stars have their Goldilocks Zones further out, while smaller cooler stars have habitable zones much closer in.

Q.125) Consider the following statements:

1. The Kuiper Belt is a region of the Solar System that exists beyond the eight major planets.
2. Kuiper belt objects are composed of rock and metal.
3. Pluto is the largest Kuiper Belt Objects.

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.125) Solution (b)

The Kuiper belt is a circumstellar disc in the outer Solar System, extending from the orbit of Neptune.

It is similar to the asteroid belt, but is far larger – 20 times as wide and 20–200 times as massive.

Like the asteroid belt, it consists mainly of small bodies or remnants from when the Solar System formed. While many asteroids are composed primarily of rock and metal, most Kuiper belt objects are composed largely of frozen volatiles such as methane, ammonia and water.

Kuiper Belt Objects are referred as the bits of rock and ice, comets and dwarf planets in the Kuiper Belt. Besides Pluto and a bunch of comets, other interesting Kuiper Belt Objects are Eris, Makemake and Haumea. They are dwarf planets like Pluto.

Q.126) Consider the following statements:

1. Mercury is smaller than the largest natural satellites in the Solar System.
2. The Sun contains 75 percent of the mass of the solar system.

3. The Surface gravity on Mars is 90 percent of the gravity on Earth

Which of the above statements is/are correct?

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

Q.126) Solution (a)

Mercury is the smallest planet in the Solar System and the closest to the Sun. Its orbit around the Sun takes 87.97 Earth days, the shortest of all the Sun's planets.

When viewed from Earth, the planet can only be seen near the western or eastern horizon during the early evening or early morning.

Mercury is smaller than the largest natural satellites in the Solar System, Ganymede (largest moon of Jupiter) and Titan (largest moon of Saturn). However, Mercury is massive (has more mass) than Ganymede and Titan.

The Sun alone carries 99.8% of the total mass of the Solar System. Sun's mass is 1.989 X 10^{30} Kilograms which is 3,33000 times that of planet Earth.

Mars is often referred to as the "Red Planet" because of the reddish iron oxide prevalent on its surface. Mars has a thin atmosphere and has surface features ranging from impact craters of the Moon and the valleys, deserts, and polar ice caps of Earth. Compared to Earth Surface gravity on Mars is only 38% the gravity on Earth.

Q.127) What are the criteria adopted by the International Astronomical Union (IAU) in order to declare any celestial object as planet?

1. It should orbit a star.
2. It should be big enough to have enough gravity to force it into a spherical shape.
3. It should have an atmosphere.

Choose the correct answer from the codes given below:

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

Q.127) Solution (a)

The definition of a planet was adopted by the International Astronomical Union in 2006. A planet must:

- It should orbit a star (in our system, it is the Sun).

- It should be big enough to have enough gravity to force it into a spherical shape.
- It should be big enough that its gravity cleared away any other objects of a similar size near its orbit around the Sun.
- It should not be a satellite (moon) of another object

Thus the Solar System consists of eight "planets" Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune which fulfil the above mentioned criteria.

Q.128) Consider the following statements:

1. Aurora on Earth is formed when solar wind particles interact with different gases in the atmosphere to cause a display of light in the night sky.
2. Unlike auroras on Earth, which are seen only near the north and south poles, Auroras on Mars are seen all around the planet at night time.

Which of the above statements is/are correct?

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

Q.128) Solution (c)

Auroras are caused when charged particles ejected from the Sun's surface — called the solar wind — enter the Earth's atmosphere. These particles are harmful, and our planet is protected by the geomagnetic field, which preserves life by shielding us from the solar wind.

However, at the north and south poles, some of these solar wind particles are able to continuously stream down, and interact with different gases in the atmosphere to cause a display of light in the night sky.

This display, known as an aurora, is seen from the Earth's high latitude regions (called the auroral oval), and is active all year round.

In the northern part of our globe, the polar lights are called aurora borealis or Northern Lights, and are seen from the US (Alaska), Canada, Iceland, Greenland, Norway, Sweden and Finland. In the south, they are called aurora australis or southern lights, and are visible from high latitudes in Antarctica, Chile, Argentina, New Zealand and Australia.

Unlike Earth, which has a strong magnetic field, the Martian magnetic field has largely died out. This is because the molten iron at the interior of the planet– which produces magnetism– has cooled.

However, the Martian crust, which hardened billions of years ago when the magnetic field still existed, retains some magnetism. So, in contrast with Earth, which acts like one single

bar magnet, magnetism on Mars is unevenly distributed, with fields strewn across the planet and differing in direction and strength.

These disjointed fields channel the solar wind to different parts of the Martian atmosphere, creating "discrete" auroras over the entire surface of the planet as charged particles interact with atoms and molecules in the sky– as they do on Earth.

Unlike auroras on Earth, which are seen only near the north and south poles, discrete auroras on Mars are seen all around the planet at night time.

Q.129) With reference to the Solar System, consider the following statements:

1. The Sun rotates faster at the poles than at the equator.
2. The Near-Surface Shear Layer of the Sun plays a significant role in defining the nature of large-scale convective patterns that drive the Sun's magnetism.

Which of the above statements is/are correct?

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

Q.129) Solution (b)

The Sun is not a solid body, but is composed of a gaseous plasma. Different latitudes rotate at different periods.

The rate of surface rotation is observed to be the fastest at the equator and to decrease as latitude increases. The solar rotation period is 24.47 days at the equator and almost 38 days at the poles. The average rotation is 28 days.

The Near-Surface Shear Layer (NSSL) exists exists very close to the solar surface, where there is an outward decrease in angular velocity. This NSSL is thought to play a significant role in defining the nature of large-scale convective patterns that drive the Sun's magnetism.

Understanding NSSL is crucial for the study of several solar phenomena like sunspot formation, solar cycle, and it will also help in understanding such phenomena in other stars.

Q.130) Consider the following statements:

1. The axis of the earth makes an angle of 66½° with its orbital plane.
2. Days and nights occur due to revolution of the earth.
3. Days are always longer than nights at the equator.

Which of the above statements is/are correct?

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

Q.130) Solution (d)

Earth rotates along its axis from west to east. It takes approximately 24 hrs to complete on rotation.

Days and nights occur due to rotation of the earth. Earth rotates on a tilted axis. Earth's rotational axis makes an angle of 23.5° with the normal i.e. it makes an angle of 66.5° with the orbital plane. Orbital plane is the plane of earth's orbit around the Sun.

Daylight at the equator is always a bit longer than darkness, the result of the refraction of light through the atmosphere that allows us to see the sun a few minutes before it rises and a few minutes after it sets.

Q.131) At which of the following places Tropical Monsoon Climate is found?

1. Eastern Africa
2. North-eastern part of South America
3. Northern Australia
4. Indian sub-continent

Choose the correct answer from the codes given below:

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

Q.131) Solution (b)

Tropical monsoon climate is mainly found between 5° to 30° latitudes in the Southern and South-Eastern part of Asia. Tropical monsoon are most commonly found in Africa (West and Central Africa), Asia (South and Southeast Asia), North-eastern part of South America and Central America. This climate also occurs in sections of the Caribbean, North America, and northern Australia.

Tropical monsoon climates have monthly mean temperatures above 18 °C (64 °F) in every month of the year and a dry season.

The major controlling factor over a tropical monsoon climate is its relationship to the monsoon circulation. The monsoon is a seasonal change in wind direction.

In Asia, during the summer (or high-sun season) there is an onshore flow of air (air moving from ocean towards land).

The change in direction is due to the difference in the way water and land heat.

Changing pressure patterns that affect the seasonality of precipitation also occur in Africa though it generally differs from the way it operates in Asia.

During the high-sun season, the Intertropical convergence zone (ITCZ) induces rain.

During the low-sun season, the subtropical high creates dry conditions. The monsoon climates of Africa, and the Americas for that matter, are typically located along trade wind coasts.

Q.132) Consider the following statements regarding Cool temperate Eastern Marine Climate:

1. It is found only in southern hemisphere.
2. It is characterised by cold, dry winters and warm, wet summers.
3. Lumbering is the most important economic undertaking of this type of climatic region.

Which of the above statements is/are correct?

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

Q.132) Solution (d)

Cool temperate Eastern Marine Climate or Laurentian type of climate is found only in two regions and that too only in the northern hemisphere.

- North-eastern North America, including eastern Canada, north-east U.S.A., and Newfoundland. This may be referred to as the North American region.
- Eastern coastlands of Asia, including eastern Siberia, North China, Manchuria, Korea and northern Japan.

This type of climate is absent in the Southern Hemisphere.

It is characterised by:

- Cold, dry winters and warm, wet summers.
- Winter temperatures are below freezing-point and snow fall is quite natural.
- Summers are as warm as the tropics (~25 °C).
- Annual rainfall ranges from 75 to 150 cm [two – thirds of rainfall occurs in the summer].

Lumbering and its associated timber, paper and pulp industries are the most important economic undertaking. Agriculture is less important because of long and severe winters.

Q.133) Consider the following statements regarding Warm Temperate Eastern Margin Climate:

1. It is found between 20° and 35° N and S latitude on the east coast in both hemispheres.
2. Natal type climate is one of the variations of Warm Temperate Eastern Margin Climate.

Which of the above statements is/are correct?

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

Q.133) Solution (c)

Warm Temperate Eastern Margin Climate:

- It is found between 20° and 35° N and S latitude (warm temperate latitudes just outside the tropics); on the east coast in both hemispheres.
- Different variants of Warm Temperate Eastern Margin Climate include the:
    - Temperate monsoon Climate or China Type Climate
    - Gulf Type Climate
    - Natal Type Climate
- Temperate Monsoon or China Type climate is observed in most parts of China. The climate is also observed in southern parts of Japan.
- Gulf type climate is found in south-eastern U.S.A., bordering the Gulf of Mexico where continental heating in summer induces an inflow of air from the cooler Atlantic Ocean.
- Natal type climate is found in New South Wales (Australia), Natal (South Africa), Parana-Paraguay-Uruguay basin (South America).
- Climatic region is characterized by a warm moist summer and a cool, dry winter (one exception: winters are also moist in Natal Type).
- The mean monthly temperature varies between 4° C and 25° C and is strongly modified by maritime influence.
- Rainfall is more than moderate, anything from 60 cm to 150 cm.
- The lowlands carry both evergreen broad-leaved forests and deciduous trees [hardwood].
- On the highlands, are various species of conifers such as pines and cypresses which are important softwoods.

Q.134) Which of the following is the distinct characteristic of the Mediterranean Climate?

a) Hot, dry summer and mild, rainy winter
b) Mild, dry summer and severe, rainy winter
c) Hot, rainy summer and mild, dry winter
d) Mild, rainy summer and severe, dry winter

Q.134) Solution (a)

The Mediterranean climate occurs around Mediterranean sea, along the west coast of continents in subtropical latitudes between 30° - 40° latitudes e.g. — Central California, Central Chile, along the coast in south eastern and south western Australia.

These areas come under the influence of sub tropical high in summer and westerly wind in winter. Hence, the climate is characterized by hot, dry summer and mild, rainy winter.

Monthly average temperature in summer is around 25° C and in winter below 10°C. The annual precipitation ranges between 35-90 cm.

Q.135) Which of the following is/are the features of Tropical wet and dry climate?

1. Extreme diurnal range of temperature
2. No distinct rainy season
3. It is a transitional type of climate found between the temperate forests and hot deserts.

Choose the correct answer from the codes given below:

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

Q.135) Solution (b)

- Tropical wet and dry climate:
- It is also known as the Savanna climate.
- This type of climate has alternate wet and dry seasons similar to monsoon climate but has considerably less annual rainfall.
- There is no distinct rainy season like in monsoon climate.
- Floods and droughts are common.
- It is confined within the tropics and is best developed in Sudan, hence its name the Sudan Climate.
- It is a transitional type of climate found between the equatorial rainforests and hot deserts.

- Mean annual rainfall ranges from 80 – 160 cm
- Mean annual temperature is greater than 18° C.
- Highest temperatures do not coincide with the period of the highest sun (e.g. June in the northern hemisphere) but occur just before the onset of the rainy season, i.e. April in Northern Hemisphere and October in Southern Hemisphere.
- Days are hot and nights are cold. This extreme diurnal range of temperature is another characteristic feature of the Sudan type of climate.
- The savanna landscape is typified by tall grass and short trees.
- The grasslands are also called as 'bush-veld'.
- The trees are deciduous, shedding their leaves in the cool, dry season to prevent excessive loss of water through transpiration, e.g. acacias.

Q.136) Consider the following statements regarding Tropical dry deciduous forests:

1. These forests are the most widespread forests in India.
2. These forests are found in the eastern slopes of the Western Ghats.
3. Amaltas, khair, axlewood are the common trees of these forests.

Which of the above statements is/are correct?

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

Q.136) Solution (d)

Tropical Deciduous Forests:

These are the most widespread forests in India. They are also called the monsoon forests. They spread over regions which receive rainfall between 70-200 cm. On the basis of the availability of water, these forests are further divided into moist and dry deciduous.

Tropical Moist Deciduous Forests:

- The Moist deciduous forests are more pronounced in the regions which record rainfall between 100-200 cm.
- These forests are found in the northeastern states along the foothills of Himalayas, eastern slopes of the Western Ghats and Odisha.
- Teak, sal, shisham, hurra, mahua, amla, semul, kusum, and sandalwood etc. are the main species of these forests.

Tropical Dry Deciduous Forests:

- Dry deciduous forest covers vast areas of the country, where rainfall ranges between 70 -100 cm.
- On the wetter margins, it has a transition to the moist deciduous, while on the drier margins to thorn forests. These forests are found in rainier areas of the Peninsula and the plains of Uttar Pradesh and Bihar.
- In the higher rainfall regions of the Peninsular plateau and the northern Indian plain, these forests have a parkland landscape with open stretches in which teak and other trees interspersed with patches of grass are common.
- As the dry season begins, the trees shed their leaves completely and the forest appears like vast grassland with naked trees all around.
- Tendu, palas, amaltas, bel, khair, axlewood, etc. are the common trees of these forests. In the western and southern part of Rajasthan, vegetation cover is very scanty due to low rainfall and overgrazing.

Q.137) Tropical Semi-Evergreen Forests is/are found in which of the following parts of India?

1. Peninsular plateau
2. Andaman Islands
3. Lower slopes of the Eastern Himalayas

Choose the correct answer from the codes given below:

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

Q.137) Solution (b)

Tropical Semi-Evergreen Forests:

- They are transitional forests between tropical wet evergreen forests and tropical deciduous forests.
- They are comparatively drier areas compared to tropical wet evergreen forests.
- Annual rainfall is 200-250 cm
- Mean annual temperature varies from 24°C to 27°C
- The relative humidity is about 75 per cent
- Distribution: Western coast of India, Assam, Lower slopes of the Eastern Himalayas, Odisha and Andaman Islands.
- Trees in these forests usually have buttressed trunks with abundant epiphytes.
- The important species are laurel, rosewood, mesua, thorny bamboo – Western Ghats, white cedar, Indian chestnut, champa, mango, etc. – Himalayan region.

- Hardwood: Similar to that in tropical evergreen forests except that these forests are less dense with more pure stands (timber industry here is better than in evergreen forests).

Q.138) The pattern of planetary winds depends upon:

1. Emergence of pressure belts
2. The earth's revolution
3. Distribution of continents and oceans

Choose the correct answer from the codes given below:

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

Q.138) Solution (a)

The pattern of planetary winds largely depends on:

- Latitudinal variation of atmospheric heating
- Emergence of pressure belts
- The migration of belts following apparent path of the sun
- The distribution of continents and oceans
- The rotation of earth

The pattern of the movement of the planetary winds is called the general circulation of the atmosphere. The general circulation of the atmosphere also sets in motion the ocean water circulation which influences the earth's climate.

Q.139) With reference to the composition of atmosphere, consider the following statements:

1. All kinds of weather changes take place in Stratosphere.
2. In stratosphere temperature increases with height due to the presence of ozone gas in the upper part of this layer.

Which of the above statements is/are correct?

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

d) Neither 1 nor 2

Q.139) Solution (b)

Stratosphere:

- It lies beyond troposphere, up to an altitude of 50 km from the earth's surface.
- The temperature in this layer remains constant for some distance but then rises to reach a level of 0°C at 50 km altitude.
- This rise is due to the presence of ozone (harmful ultraviolet radiation is absorbed by ozone).
- Weather related incidents do not take place in this layer. The air blows horizontally here. Therefore this layer is considered ideal for flying of aircrafts.
- Sometimes, cirrus clouds are present at lower levels in this layer

Q.140) Consider the following statements:

1. The tundra has thick evergreen coniferous forests, while in the taiga trees are absent completely.
2. Tundra climate is also known as boreal climate.

Which of the above statements is/are correct?

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

Q.140) Solution (d)

Taiga climate is found only in the northern hemisphere hence also known as Boreal forests. (Boreal means relating to the region of the earth just south of the Arctic.

It stretches along a continuous belt across central Canada, some parts of Scandinavian Europe and most of central and southern Russian. [50° to 70° N]

The taiga has a thick forest of conifers such as pine and spruce, while in the tundra trees are absent completely. This is due in part to the lack of water available in the tundra, but also is a result of permafrost. Trees have great difficulty growing stable roots in frozen ground.

While both the tundra and taiga have lichens and mosses, many grasses and wildflowers grow in the tundra that are less common in the taiga.

The soil in the taiga is highly acidic and low in nitrogen, making growth difficult for plants that are not adapted to the environment.

Q.141) "Leuser Ecosystem", seen sometimes in news, is found in:

a) Brazil
b) Indonesia
c) South Africa
d) Australia

Q.141) Solution (b)

The Leuser Ecosystem is an area of forest located in the provinces of Aceh and North Sumatra on the island of Sumatra in Indonesia.

It is one of the richest expanses of tropical rain forest in Southeast Asia and is the last place on earth where the Sumatran elephant, rhino, tiger and orangutan are found within one area.

It has one of the world's richest yet least-known forest systems, and its vegetation is an important source of Earth's oxygen.

Industrial development for palm oil, pulp and paper plantations and mining continues to threaten the entire ecosystem.

The fires from this widespread destruction have caused major haze pollution from Singapore to Jakarta, resulting in huge economic losses and public health issues.

Sumatra's unique species are dying out with their negligible populations left and few on the verge of extinction.

Q.142) Caspian Sea is a border of which of the following countries?

1. Iraq
2. Turkey
3. Azerbaijan
4. Russia

Choose the correct answer from the codes given below:

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

Q.142) Solution (c)

The Caspian Sea is the world's largest inland body of water, variously classed as the world's largest lake or a full-fledged sea.

It is bordered by Russia to the northwest, Azerbaijan to the west, Iran to the south, Turkmenistan to the southeast and Kazakhstan to the northeast.

The Caspian Sea faces many ecological threats that have ramifications on human residents of the area, flora and fauna, the economy and the overall ecosystem. The intensive oil and gas development in the Caspian region has caused serious water, air and land pollution problems, natural resources depletion, harm to wildlife and plant life, ecosystem disturbance, desertification and loss of biological and landscape diversity.

Q.143) Nagorno-Karabakh, seen sometimes in news is a disputed region between:

a) Armenia and Azerbaijan
b) Tajikistan and Kyrgyzstan
c) Turkmenistan and Armenia
d) Oman and Jordan

Q.143) Solution (a)

Nagorno-Karabakh is a disputed territory between Armenia and Azerbaijan.

Nagorno-Karabakh is part of Azerbaijan, but its population is majority Armenian. As the Soviet Union saw increasing tensions in its constituent republics in the 1980s, Nagorno-Karabakh voted to become part of Armenia - sparking a war that stopped with a ceasefire in 1994.

Since then, Nagorno-Karabakh has remained part of Azerbaijan but is controlled by separatist ethnic Armenians backed by the Armenian government. Until recently, negotiations mediated by international powers had failed to deliver a peace agreement.

Armenia is majority Christian while Azerbaijan is majority Muslim. Turkey has close ties to Azerbaijan, while Russia is allied with Armenia - although it also has good relations with Azerbaijan.

Q.144) Which of the following states share border with Myanmar?

1. Tripura
2. Nagaland
3. Meghalaya

Choose the correct answer from the codes given below:

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

Q.144) Solution (b)

Four North-Eastern States viz. Arunachal Pradesh, Nagaland, Manipur and Mizoram share international boundary with Myanmar. Both countries share a heritage of religious, linguistic and ethnic ties.

Q.145) Which of the following pairs is/are correctly matched?

S.No.	Mountain Passes	Location
1.	Kumjawng Pass	Arunachal Pradesh
2.	Dongkhala	Nagaland
3.	Kunzum	Manipur

Choose the correct answer from the codes given below:

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

Q.145) Solution (a)

Kumjawng Pass lies on Indo-Myanmar border at an altitude of 2929 and joins Arunachal Pradesh with Myanmar.

The Dongkha La is a high mountain pass in the Himalaya connecting Sikkim in India with Tibet.

Kunzum Pass is located in Himachal Pradesh. It connects Lahaul valley and Spiti valley.

Q.146) Which of the following pairs is/are correctly matched?

S. No.	Protected Area	River flowing inside the protected area
1.	Papikonda	Periyar
2.	Khangchendzonga	Teesta
3.	Jim Corbett	Ramganga

Choose the correct answer from the codes given below:

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

Q.146) Solution (d)

Papikonda National Park is located in Andhra Pradesh. It is an Important Bird and Biodiversity Area and home to some endangered species of flora and fauna. The vegetation of Papikonda national park contains species of moist deciduous and dry deciduous forests. Godavari River flows through the park.

Khangchendzonga National Park is a national park and a Biosphere reserve located in Sikkim. It was inscribed to the UNESCO World Heritage Sites list in July 2016, becoming the first "Mixed Heritage" site of India. Teesta River flows through it. The vegetation of the park include temperate broadleaf and mixed forests consisting of oaks, fir, birch, maple, willow.

Jim Corbett National Park is a national park in India located Uttarakhand. The park has sub-Himalayan belt geographical and ecological characteristics. Dense moist deciduous forest mainly consists of sal, haldu, peepal, rohini and mango trees. The park encompasses the Patli Dun valley formed by the Ramganga river.

Q.147) The 6 degree channel in Indian Ocean marks the divide between:

a) Andaman Islands and Nicobar Islands
b) Indira Point and Indonesia
c) Minicoy Islands and Amindivi Islands
d) Indira Point and Srilanka

Q.147) Solution (b)

The southern endpoint of India is the Indira point and is also called as the Pygmalion Point and is located in the southern point of the greater Nicobar Islands.

Rondo island of Indonesia is the northernmost island in the province of Sumatra and is located about 163 km to the south of the little Andaman Island.

The point has an elevation of 47 meters. This six-degree channel is located at 6 degrees north of the equator and thus is popular, called the 6-degree channel.

Q.148) Which of the following water body connects the Red Sea to the Gulf of Aden?

a) Bab-el-Mandeb Strait
b) Otranto Strait
c) Bosporous Strait
d) Hormuz Strait

Q.148) Solution (a)

The Bab-el-Mandeb is a strait between Yemen on the Arabian Peninsula, and Djibouti and Eritrea in the Horn of Africa. It connects the Red Sea to the Gulf of Aden.

The Bab-el-Mandeb acts as a strategic link between the Indian Ocean and the Mediterranean Sea via the Red Sea and the Suez Canal.

Q.149) The Bosporous Strait connects:

a) Medditerranean Sea with the Red Sea
b) Persian Gulf with the Arabian Sea
c) Caspian Sea with the Aral Sea
d) Black Sea with the Sea of Marmara

Q.149) Solution (d)

Bosporous Strait is the world's narrowest strait used for international navigation. The Bosporus connects the Black Sea with the Sea of Marmara, and, by extension via the Dardanelles, the Aegean and Mediterranean seas, and by the Kerch Strait, the Sea of Azov.

Q.150) Which of the following are the marginal Seas of the Atlantic Ocean?

1. Caribbean Sea
2. Labrador Sea
3. Red Sea

Choose the correct answer from the codes given below:

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

Q.150) Solution (a)

The Atlantic Ocean is the second-largest of the world's oceans. The Atlantic Ocean occupies an elongated, S-shaped basin extending longitudinally between Europe and Africa to the east, and the Americas to the west. As one component of the interconnected World Ocean, it is connected in the north to the Arctic Ocean, to the Pacific Ocean in the southwest, the Indian Ocean in the southeast, and the Southern Ocean in the south. The Atlantic Ocean is divided into two parts, by the Equatorial Counter Current, with the Northern Atlantic Ocean and the Southern Atlantic Ocean at about 8°N.

Some of the marginal Seas of Atlantic Ocean are:

- Argentine Sea

- Caribbean Sea
- English Channel
- Gulf of Mexico
- Hudson Bay
- Irish Sea
- Labrador Sea
- Mediterranean Sea
- North Sea
- Norwegian Sea
- Scotia Sea

The Red Sea is a seawater inlet of the Indian Ocean, lying between Africa and Asia.

Q.151) With reference to the Drainage system, consider the following statements:

1. When the rivers originate from a hill and flow in all directions, the drainage pattern is known as radial.
2. When the rivers discharge their waters from all directions in a lake or depression, the pattern is known as trellis.
3. When the primary tributaries of rivers flow parallel to each other and secondary tributaries join them at right angles, the pattern is known as centripetal.

Which of the above statements is/are correct?

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

Q.151) Solution (a)

In a radial drainage system, the streams radiate outwards from a central high point. Volcanoes usually have archetypal features on which radial pattern commonly develops. In India, the Amarkantak range and Ramgarh crater are most archetypal.

In trellis drainage pattern the short subsequent streams meet the main stream at right angles, and differential erosion through soft rocks paves the way for tributaries. The old folded mountains of the Singhbhum (Chotanagpur Plateau) and Seine and its tributaries in Paris basin (France) have drainage of trellis pattern.

When the streams coverge at a point, which is generally a depression or a basin they form centripetal or inland drainage pattern. In this pattern the rivers discharge their waters frm all directions in a lake or depression. Streams of Ladakh, Tibet, and the Baghmati and its tributaries in Nepal are examples of centripetal drainage pattern.

Q.152) Which of the following statements is/are correct about River Ghaghra?

1. The River is tran-himalayan in origin.
2. It joins Yamuna River in Bihar.
3. Sarda, Sarju and Rapti are its important tributaries.

Choose the correct answer from the codes given below:

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

Q.152) Solution (c)

Ghaghara is a perennial trans-boundary river originating on the Tibetan Plateau near Lake Manasarovar. It cuts through the Himalayas in Nepal and joins the Sharda River at Brahmaghat in India. Together they form the Ghaghara River, a major left bank tributary of the Ganges.

Its important tributaries are the Sarda, the Sarju, the Kuwana, the Little Gandak and the Rapti.

The Ghaghara joins the Ganga a few kilometres downstream of Chhapra in Bihar.

The Katarniaghat Wildlife Sanctuary is a protected area located on the banks of Sarayu River, a tributary of River Ghaghara.

Q.153) Which of the following pairs is/are correctly matched?

S. No.	Tributary	River
1.	Rihand	Kosi
2.	Ib	Mahanadi
3.	Banas	Narmada

Choose the correct answer from the codes given below:

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

Q.153) Solution (b)

Rihand:

- The Rihand River is a tributary of the Son River and flows through the states of Chhattisgarh and Uttar Pradesh. Its old name was Renu or Renuka.

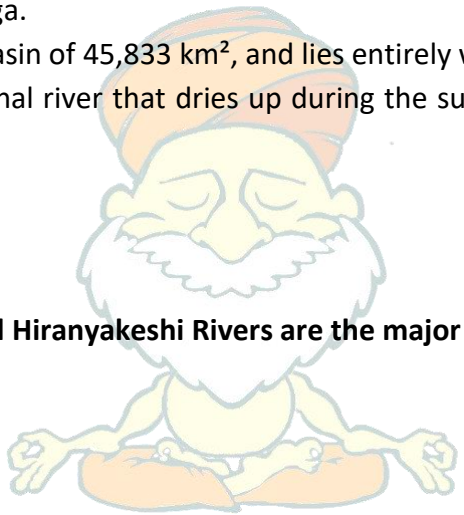
- The Rihand rises from Matiranga hills, in the region south west of the Mainpat plateau, which is about 1,100 meters above mean sea level.
- The Rihand Dam was constructed across the Rihand River in Sonbhadra district of Uttar Pradesh in 1962 for hydropower generation.

Ib:

- Ib River is tributary of Mahanadi River in North-Eastern Central India.
- It joins Mahanadi River flowing directly into the Hirakud Reservoir.
- The river originates in hills near Pandrapet at an elevation of 762 metres.
- Ib river valley is famous for its rich coal belt. Major portions of Mahanadi Coalfields are situated on the banks of Ib.

Banas:

- The Banas is a river which lies entirely within the state of Rajasthan in western India.
- It is a tributary of the Chambal River, itself a tributary of the Yamuna, which in turn merges into the Ganga.
- The Banas drains a basin of 45,833 km², and lies entirely within Rajasthan.
- The Banas is a seasonal river that dries up during the summer, but it is nonetheless used for irrigation.



Q.154) The Markandeya and Hiranyakeshi Rivers are the major tributaries of:

a) Bhima River
b) Malprabha River
c) Tungabhadra River
d) Ghatprabha River

Q.154) Solution (d)

Ghatprabha River:

- The Ghataprabha river is an important right-bank tributary of the Krishna River and flows eastward for a distance of 283 kilometers before its confluence with the Krishna River at Chikksangam
- The river basin is 8,829 square kilometers wide and stretches across Maharashtra and Karnataka states.
- The Markandeya and Hiranyakeshi rivers are tributaries of the Ghataprabha River.

Q.155) Which of the following pairs is/are correctly matched?

S. No.	River	Flows through the States
1.	Mahanadi	Chhattisgarh and Odisha
2.	Godavari	Maharashtra, Chhattisgarh and Andhra Pradesh
3.	Narmada	Madhya Pradesh, Maharashtra and Gujarat

Choose the correct answer from the codes given below:

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

Q.155) Solution (c)

Mahanadi River:

- Mahanadi River has its source in the northern foothills of Dandakaranya in Raipur District of Chhattisgarh at an elevation of 442 m.
- The Mahanadi follows a total course of 560 miles (900 km).
- The Mahanadi basin extends over states of Chhattisgarh and Odisha and comparatively smaller portions of Jharkhand, Maharashtra, and Madhya Pradesh, draining an area of 1.4 lakh Sq.km.

Godavari River:

- The Godavari River is the largest river in peninsular India and known as the 'Dakshina Ganga'.
- The Godavari Basin is the second largest basin after the Ganges basin and accounts for nearly 9.50 % of the total geographical area of the country.
- The River rises in the Sahyadris, at an altitude of 1,067 m above mean sea level near Trimbakeshwar in the Nashik district of Maharashtra and flows across the Deccan Plateau from the Western to the Eastern Ghats.
- Main river flows through the States of Maharashtra Telangana, Chhattisgarh, and Andhra Pradesh and finally out falls into the Bay of Bengal.

Narmada River:

- The Narmada, the largest west flowing river of the Peninsula, rises near Amarkantak range of mountains in Madhya Pradesh.
- It is the fifth largest river in the country and the largest one in Gujarat.
- The total basin area of the river is 97,410 square kilometer comprising 85,858 square kilometer in Madhya Pradesh, 1658 square kilometer in Maharashtra and 9894 square kilometer in Gujarat.

Q.156) Which of the following pairs is/are correctly matched?

S. No.	Hydro-Power Project	Located on river
1.	Nizam Sagar	Manjira
2.	Gandhi Sagar	Narmada
3.	Gobind Sagar	Sutlej

Choose the correct answer from the codes given below:

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

Q.156) Solution (d)

Nizam Sagar Dam is a reservoir constructed across the Manjira River, a tributary of the Godavari River. Nizam Sagar is the oldest dam in the state of Telangana.

The Gandhi Sagar Dam is one of the four major dams built on India's Chambal River. It is located in Madhya Pradesh.

Gobind Sagar Lake is a reservoir situated in Una and Bilaspur districts of Himachal Pradesh. It is formed by the Bhakra Dam. The reservoir is on the river Sutlej and is named in honour of Guru Gobind Singh, the tenth Sikh guru.

Q.157) Which of the following statements is/are correct regarding River Tungabhadra?

1. It is a tributary of River Cauvery.
2. It originates at Koodli in Karnataka.
3. It flows only in Karnataka and drains into Arabian Sea.

Choose the correct answer from the codes given below:

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

Q.157) Solution (a)

Tungabhadra is a sacred river in southern India that flows through the state of Karnataka to Andhra Pradesh. It is an important tributary of River Krishna. The ancient name of the river was Pampa.

The Tungabhadra River is formed by the confluence of the Tunga River and the Bhadra River at Koodli which flow down the eastern slope of the Western Ghats in the state of Karnataka.

The greater part of the Tungabhadra's course lies in the southern part of the Deccan plateau. The river is fed mainly by rain, and it has a monsoonal regimen with summer high water.

It's Major tributaries are the Bhadra, the Haridra, the Vedavati, the Tunga, the Varda and the Kumdavathi.

Q.158) Which of the following states are covered by the Brahmaputra Drainage Basin?

1. Meghalaya
2. Tripura
3. Nagaland
4. Mizoram
5. Arunachal Pradesh

Choose the correct answer from the codes given below:

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

Q.158) Solution (c)

Brahmaputra Drainage Basin:

- Area of Brahmaputra basin is 580,000 sq.km. which covers China (50.5%), India (33.6%), Bangladesh (8.1%) and Bhutan (7.8%). Length in India is 916km.
- Brahmaputra basin spans states of Arunachal Pradesh, Assam, West Bengal, Meghalaya, Nagaland and the whole of Sikkim in India
- Brahmaputra catchment is the heaviest rainfall region in the world.
- Brahmaputra basin, particularly the portions in Assam, is prone to annual floods and river bank erosions.
- Parts of the Himalayan Mountains region of Sikkim and Arunachal Pradesh falling in Brahmaputra basin experience snow cover.
- Brahmaputra basin represents the greenest part of India, accounting for the maximum 55.48% (107854.26 sq.km.) of country's forest cover.
- In the middle reach of Brahmaputra River is "Majuli", the river island in Assam which is marked as the largest mid river delta system in the world by UNESCO.
- The hydroelectric potential of the Brahmaputra basin has been assessed 66065 MW.

Q.159) Which of the following is/are the conditions for the emergence of Tropical Cyclones?

1. Large and continuous supply of warm and moist air

2. Weak Coriolis force
3. absence of strong vertical wind wedge

Choose the correct answer from the codes given below:

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

Q.159) Solution (d)

Tropical cyclones are intense low-pressure areas confined to the area lying between 30° N and 30° S latitudes, in the atmosphere around which high velocity winds blow. Horizontally, it extends up to 500-1,000 km and vertically from surface to 12-14 km. A tropical cyclone or hurricane is like a heat engine that is energized by the release of latent heat on account of the condensation of moisture that the wind gathers after moving over the oceans and seas.

- Large and continuous supply of warm and moist air that can release enormous latent heat.
- Strong Coriolis force that can prevent filling of low pressure at the centre (absence of Coriolis force near the equator prohibits the formation of tropical cyclone between 0°-5° latitude).
- Unstable condition through the troposphere that creates local disturbances around which a cyclone develops.
- Finally, absence of strong vertical wind wedge, which disturbs the vertical transport of latent heat.

Tropical cyclones are characterised by large pressure gradients. The centre of the cyclone is mostly a warm and low-pressure, cloudless core known as eye of the storm. Generally, the isobars are closely placed to each other showing high-pressure gradients. Normally, it varies between 14-17mb/100 km, but sometimes it can be as high as 60mb/100km. Expansion of the wind belt is about 10-150 km from the centre.

Q.160) What is/are the reasons for microclimatic zone shifting in India?

1. Change in land-use patterns
2. Urban heat islands
3. Encroachments upon mangroves

Choose the correct answer from the codes given below:

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

Q.160) Solution (d)

The microclimates of a region are defined by the moisture, temperature, and winds of the atmosphere near the ground, the vegetation, soil, and the latitude, elevation, and season. Weather is also influenced by microclimatic conditions. Wet ground, for example, promotes evaporation and increases atmospheric humidity.

Microclimatic zones are shifting across various districts of India. A shift in microclimate zones may lead to severe disruptions across sectors. For example: every 2 degrees Celsius rise in annual mean temperature will reduce agricultural productivity by 15-20%.

Some reasons identified behind this shift in microclimatic zones is change in land-use patterns, deforestation, encroachments upon mangroves, disappearing wetlands and natural ecosystems by encroachment, and urban heat islands that trap heat locally.