

Q.1) Which among the following includes the elements that influence the making of climates?

1. Temperature
2. Precipitation
3. Humidity
4. Air pressure
5. Winds

Choose the appropriate answer from the code given below:

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

Q.1) Solution (d)

All the five – Temperature, Precipitation, Humidity, Air pressure and Winds – are elements that influence the making of climates.

These climatic elements individually and in combination with each other vary from place to place and from season to season. These variations ultimately produce climatic variations.

Q.2) Consider the below statements with regard 'dew':

1. The ideal conditions for formation of dew are clear sky, calm air, high relative humidity, and cold and long nights.
2. For the formation of dew, it is necessary that the dew point is below the freezing point.

Which of the statements given above is/are correct?

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) None

Q.2) Solution (a)

Dew is the moisture that forms as a result of condensation. Condensation is the process a material undergoes as it changes from a gas to a liquid. Dew is the result of water changing from a vapor to a liquid.

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Dew forms as temperatures drop and objects cool down. If the object becomes cool enough, the air around the object will also cool. Colder air is less able to hold water vapor than warm air. This forces water vapor in the air around cooling objects to condense. When condensation happens, small water droplets form—dew.

The temperature at which dew forms is called the dew point. The dew point varies widely, depending on location, weather, and time of day.

The ideal conditions for its formation are clear sky, calm air, high relative humidity, and cold and long nights. However, for the formation of dew, it is necessary that the dew point is above the freezing point (not below). Hence, statement (2) is wrong.

Q.3) Which among the following are benefits of Atmosphere?

1. It protects from harmful radiation
2. It contains living gases
3. Acts as Green house, allows long-wave radiation and traps short-wave radiation
4. Acts as medium for fast air transport
5. Storehouse for water vapour and leads to precipitation

Choose the appropriate code:

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

Q.3) Solution (c)

Explanation:

- Atmosphere contains living gases like oxygen for man and animal, and carbon dioxide for plants (important for survival)
- It protects the earth from the harmful radiation from the sun. It acts as Green house by allowing short-wave radiation (from Sun) and trapping long-wave terrestrial radiation (from Earth's surface)

Q.4) Consider the following statements about the Atmosphere:

1. The gases present in atmosphere are the direct residue of the early stage of earth's formation.
2. Atmosphere acts as Green house by allowing long-wave from Sun and trapping short-wave terrestrial radiation from Earth's surface.

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Which of the statements given above is/are correct?

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

Q.4) Solution (d)

Atmosphere contains living gases like oxygen for man and animal, and carbon dioxide for plants (important for survival)

It protects the earth from the harmful radiation from the sun. It acts as Green house by allowing short-wave radiation (from Sun) and trapping long-wave terrestrial radiation (from Earth's surface)

The gases present in atmosphere are not the direct residue of the early stage of earth's formation. They are a product of progress through volcanic eruptions, hot springs, chemical breakdowns of solid matter and redistribution from biosphere.

Q.5) Consider the following statements:

1. Mesosphere lies above the stratosphere and temperature increases with increase in altitude.
2. Troposphere extends up to 18km at equator and 8 km at pole.
3. The temperature at tropopause over the equator is less than that the temperature of tropopause over the pole.

Which of the above statements are correct?

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

Q.5) Solution (b)

The *mesosphere* lies above the stratosphere, which extends up to a height of 80 km. In this layer, once again, temperature starts decreasing with the increase in altitude and reaches up to minus 100°C at the height of 80 km. The upper limit of mesosphere is known as the *mesopause*.

The troposphere is the lowermost layer of the atmosphere. Its average height is 13 km and extends roughly to a height of 8 km near the poles and about 18 km at the equator.

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The zone separating the troposphere from stratosphere is known as the *tropopause*. The air temperature at the tropopause is about minus 80 degree C over the equator and about minus 45°C over the poles. The temperature here is nearly constant, and hence, it is called the tropopause. *The stratosphere* is found above the tropopause and extends up to a height of 50 km.

Q.6) Consider the below statements with regard to Stratosphere:

1. It lies above the troposphere and extends uniformly across the globe up to 50km.
2. In this layer the temperature increases with increase in height.
3. This layer is characterized with the presence of Ozonosphere.

Which of the statements given above is/are correct?

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

Q.6) Solution (d)

Stratosphere:

- It lies above the troposphere and extends uniformly across the globe up to 50km.
- In this layer the temperature increases with increase in height. The temperature varies from -57 to 0 degree C.
- This layer is characterized with the presence of Ozonosphere. Ozone is highly reactive oxygen molecule made up of three atoms. Ozone absorbs the high frequency ultra violet radiations. Because of this absorption the temperature of the layer increases. The energy absorbed is used in chemical reactions causing the formation of ozone gas.
- Ultra violet rays are highly harmful for living organism including plants, animals as well as humans. Absorbing these radiations ozone layers makes a protective layer around us.

Q.7) In which of the following situations, condensation can take place?

1. When the temperature of the air is reduced to dew point with its volume remaining constant.
2. When both the volume and the temperature are reduced.
3. When moisture is added to the air through evaporation.

Select the code from below:

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

Q.7) Solution (d)

Condensation is influenced by the volume of air, temperature, pressure and humidity. Condensation takes place:

- (i) when the temperature of the air is reduced to dew point with its volume remaining constant;
- (ii) when both the volume and the temperature are reduced;
- (iii) when moisture is added to the air through evaporation.

However, the most favourable condition for condensation is the decrease in air temperature.

Q.8) The average temperature on earth remains constant. This is because:

- a) Earth retains the sun's heat and the net heat radiated by earth back to space is less than the heat received by the earth from sun.
- b) The net heat radiated by the earth back to space is equal to the heat received by the earth.
- c) The net heat radiated back by the earth is more than the heat received by the earth.
- d) None of the above statements are correct.

Q.8) Solution (b)

The net heat balance of earth is zero. The amount of heat received by the earth is equal to the amount radiated back by the earth to the space.

Had there been a residual heat, the planet would have constantly become warmer.

Q.9) Consider the following surface winds:

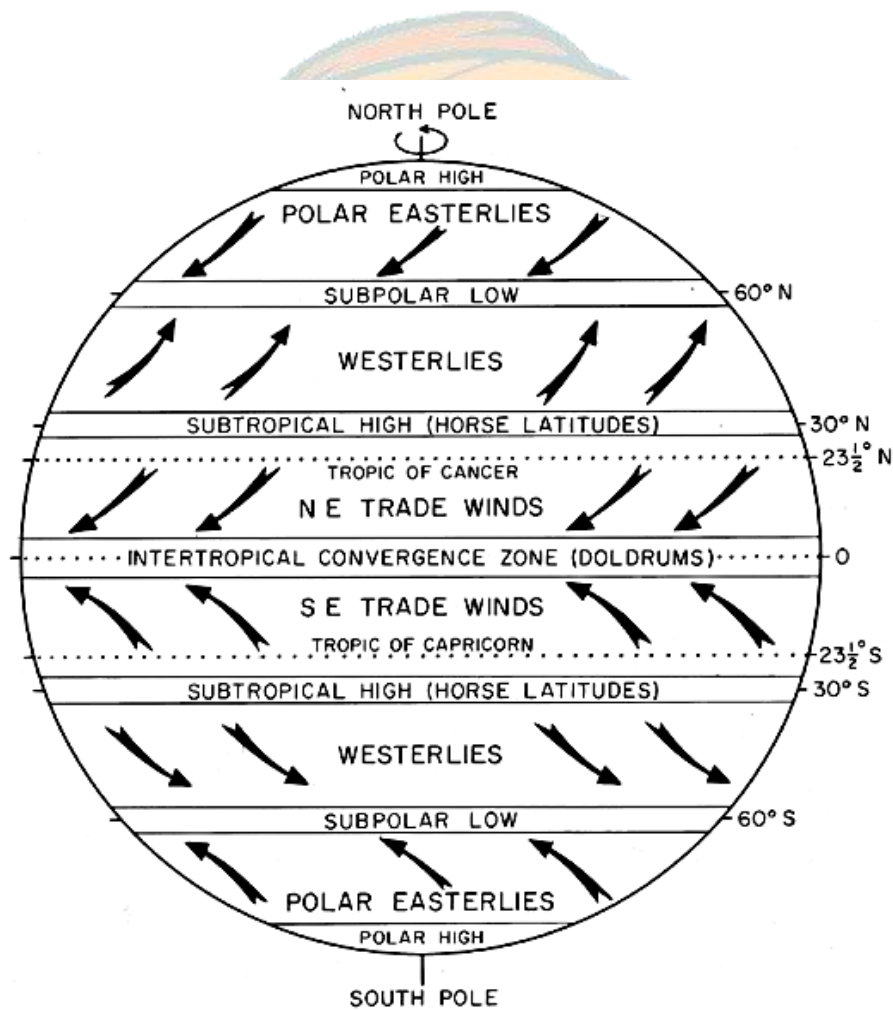
- 1. Doldrums
- 2. Trade winds
- 3. Westerlies
- 4. Polar winds

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Which one among the following is the idealized global pattern of these winds from the Equator to the pole?

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

Q.9) Solution (a)



Q.10) Consider the below statements:

1. Trade winds are the winds with an easterly component which blow from sub tropical low pressure belt to equator.

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2. The sub tropical high pressure belt of the oceans of north pacific and north atlantic oceans is known as horse latitudes.

Which of the statements given above is/are correct?

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

Q.10) Solution (b)

The trade winds or easterlies are called planetary winds. These winds follow a defined track throughout the year.

Trade winds are the winds with an easterly component which blow from sub tropical high pressure belt to equator. They derive their name from the Latin word “trado” which means constant direction. The trade winds blow with great regularity over the oceans throughout the year.

The main function of the trade winds is to remove surplus heat from the sub tropical high pressure belts by evaporating great quantity of water vapour from the tropical oceans. This process helps in maintaining the global heat balance. Although quite, the tropical cyclones are experienced in this belt. In general the speed of the trade winds varies from 15-30 km/h.

Horse latitudes: the sub tropical high pressure belt of the oceans of north pacific and north atlantic oceans is known as horse latitudes. This is a belt of weak variable winds and frequent calms.

Q.11) Consider the following statements:

1. Coriolis force is weakest along the equator but increases progressively towards the poles.
2. Trade winds are deflected in anti-clockwise direction in northern hemisphere and Clock-wise direction in the southern hemisphere.

Choose codes from below options:

- a) 1 only
- b) 2 only
- c) Both 1 and 2
- d) None

Q.11) Solution (d)

Coriolis force is absent along the equator but increases progressively towards the poles.

Trade winds are deflected in Clockwise direction in northern hemisphere and Anti-clock- wise direction in the southern hemisphere.

Q.12) Consider the following statements in regard to Westerlies:

1. Westerlies blow from the Sub-tropical high Pressure Belt to the Sub-polar low Pressure Belt in the temperature latitudes between 30° N and 60° S latitudes
2. They are more constant and stronger in the Southern Hemisphere because there are no large landmasses to interrupt them
3. It got the name Westerlies because they blow out of the west

Which of the statements given above is/are incorrect?

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

Q.12) Solution (c)

Explanation:

- Westerlies blow from the Sub-tropical high Pressure Belt to the Sub-polar low Pressure Belt in the temperature latitudes between 30° and 60° , on either side of the equator
- They are more constant and stronger in the Southern Hemisphere because there are no large landmasses to interrupt them
- In places they become so strong, these winds are known as Roaring Forties or the Brave West winds and the Furious Fifties
- The belts of the Westerlies move north and south following the Sun's movement. These are known as Westerlies because they blow out of the west.

Q.13) Consider the following statements in regard to Depressions:

1. Depressions are low pressure systems that form in the mid-latitude region ($30-60$ N/S) when warm air meets cold air

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2. When this occurs the warm air is forced above the colder air. It then cools and clouds form which produce rain
3. Winds in depressions move in an clockwise direction in the northern hemisphere and anti-clockwise in the southern hemisphere
4. Depressions are characterised by fronts

Which of the statements given above is/are correct?

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

Q.13) Solution (c)

Explanation:

- Depressions are low pressure systems that form in the mid-latitude region (30-60 N/S) when warm air meets cold air. When this occurs the warm air is forced above the colder air. It then cools and clouds form which produce rain.
- Winds in depressions move in an **anti-clockwise direction in the northern hemisphere** and **clockwise in the southern hemisphere** (hence 3rd statement is wrong)

Q.14) Consider the following statements regarding equatorial climate:

1. Very heavy down pour, normally for a short duration in a year.
2. Convectional rainfall characterised by lightning and thunder.
3. There is a very high diurnal temperature range in equatorial regions.

Select the correct answer

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

Q.14) Solution (b)

Equatorial regions have very low diurnal temperature range and rainfall occur throughout the year.

Q.15) Consider the following statements with regard to cyclones:

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1. The centre of Tropical cyclone is characterized by extremely low pressure. There is no temperature variation in their different parts.
2. Normally Tropical cyclones move from east to west under the influence of trade winds and they mainly occur in summer.
3. Temperate Cyclones always travel from west to east and are produced only in winter.

Which of the statements given above is/are correct?

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

Q.15) Solution (a)

Explanation:

- The centre of Tropical cyclone is characterized by extremely low pressure. There is no temperature variation in their different parts.
- Normally Tropical cyclones move from east to west under the influence of trade winds and they mainly occur in summer.
- Temperate Cyclones always travel from west to east and more cyclones are produced in winter than in summer. (not only in winter)

Cyclones and Anti-cyclones, they both describe the action of air movement, though in different directions. In the Northern hemisphere, cyclones (low pressure areas) have air rotating in an anticlockwise direction. Conversely, anticyclones (high pressure areas), have air rotating around them in a clockwise manner.

Major differences:

Cyclones

- (i) It is an area of low pressure surrounded by high pressure.
- (ii) Winds converge at the eye (central low pressure) of the cyclone, wind moves in a spiral motion.
- (iii) Stormy conditions prevail.
- (iv) Winds blow in an anti-clock-wise direction in the Northern hemisphere and vice-versa in the Southern hemisphere.

Anticyclones

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- (i) It is an area of high pressure surrounded by low pressure.
- (ii) Winds diverge from the central high pressure to the surrounding low pressure.
- (iii) Light cool winds blow.
- (iv) Winds blow in a clockwise direction in the Northern hemisphere and vice-versa in the Southern hemisphere.

Q.16) Which among the following statements is not true with regard to monsoons?

1. Southwest monsoon brings rain during summer whereas Northeast monsoon brings rain during winter
2. Direction of Northeast monsoon is land to sea so it doesn't contain moisture and brings dryness and coldness after blowing through Bay of Bengal and brings rainfall only in Tamil Nadu
3. During Southwest monsoon, Indian Subcontinent has high pressure and the direction of air movement is from Australia to Indian subcontinent

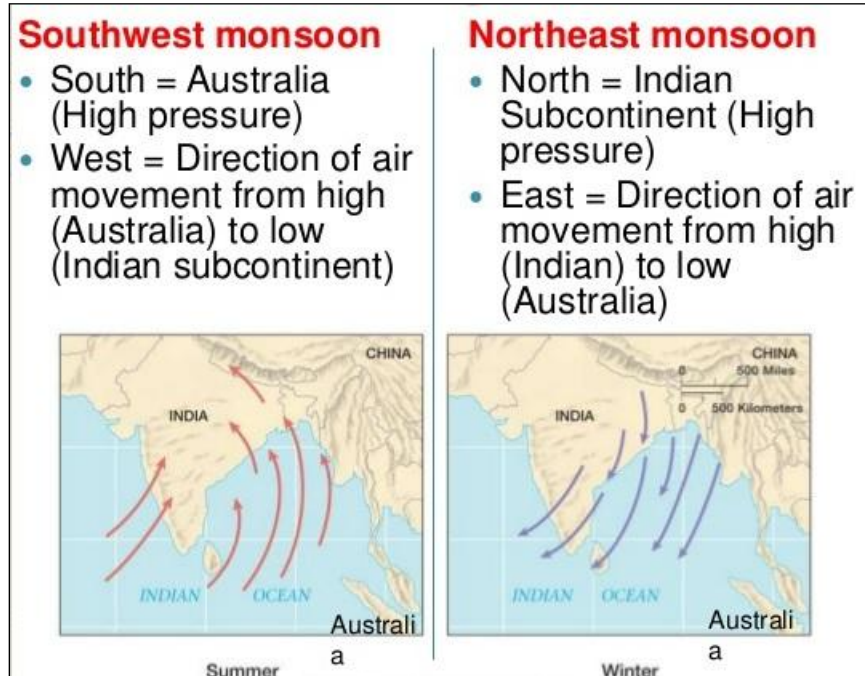
Choose the appropriate code:

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

Q.16) Solution (a)

Explanation:

- During Southwest monsoon, Indian Subcontinent has low pressure and the direction of air movement is from Australia (high) to Indian subcontinent (low)
- Second statement is wrong as Northeast monsoon also brings rainfall in Andhra Pradesh, Puducherry apart from Tamil Nadu



Q.17) Consider the following statements in regard to Equatorial climate zone/region:

1. As equatorial and tropics have thick vegetation and tree cover, they have great potential in commercial extraction of timber resources and paper-making industries
2. Mahogany, ebony, rosewood, rubber and cinchona are important tree species found in this region
3. Pygmies, Orang Asli and Semangs are examples of tribal community found in this region

Which of the statements given above is/are correct?

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

Q.17) Solution (a)

Explanation:

- Though the equatorial or tropics have great potential in timber resources, commercial extraction is difficult.
- The tree do not occur in homogenous stands, there are no frozen surfaces to facilitate logging and the tropical hardwoods are sometimes too heavy to float in rivers (for transportation)

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- Moreover, paper making industries need softwood trees (found in temperate regions and coniferous forest regions) rather than hardwood trees of equatorial or tropical regions
- Other statements are correct and self-explanatory

Q.18) Arrange the following natural vegetation types when you travel from Odisha to Rajasthan east to west:

- 1) Tropical Evergreen
- 2) Tropical Moist Deciduous
- 3) Tropical Dry Deciduous
- 4) Tropical Thorn
- 5) Littoral or Swamp
- 6) Desert Vegetation

Select the correct code:

- a) 5-1-2-3-4-6
- b) 1-2-3-5-4-6
- c) 5-2-3-1-4-6
- d) 1-2-5-3-4-6

Q.18) Solution (a)

Source: Refer Orient BlackSwan (Thematic Map – Natural Vegetation)

Q.19) Which of the following will have largest Albedo?

- a) Ocean Surface
- b) White Snow covered landmass
- c) Deserts
- d) Water logged paddy fields

Q.19) Solution (b)

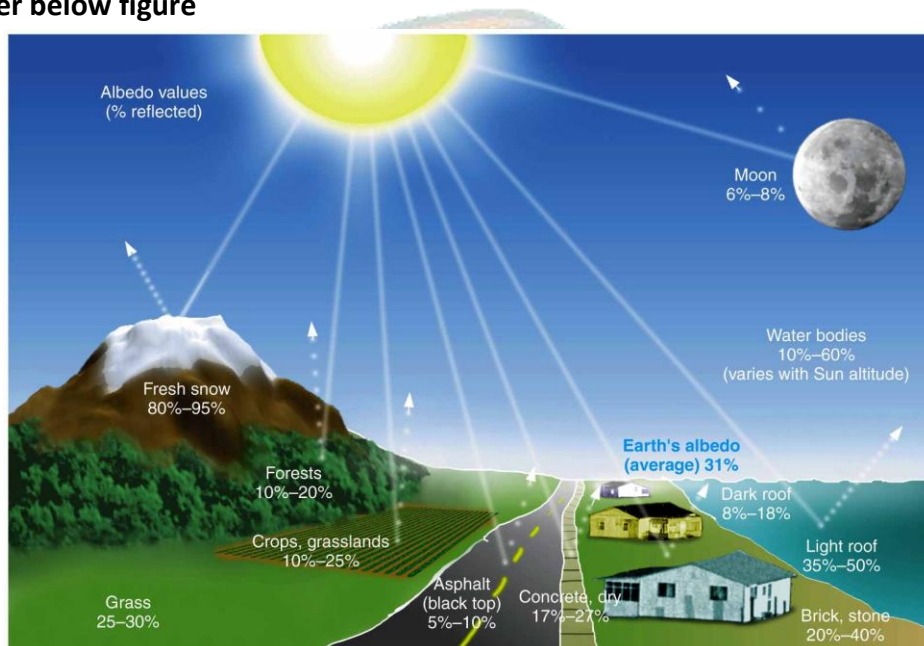
Explanation:

- The Earth's surface consists of 71 percent ocean and 29 percent land. Liquid water absorbs most of the sunlight falling upon it and reflects very little.
- The albedo of most land areas, such as soil or sand, is also relatively low, varying between 15 percent and 45 percent.

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- The exception is snow, which is most frequently found at the poles of the Earth. Snow reflects the majority of the light that strikes it, leading to a high albedo of approximately 90 percent.
- If Earth was completely covered in ice, its albedo would be about 0.84, meaning it would reflect most (84 percent) of the sunlight that hit it.
- On the other hand, if Earth was covered by a dark green forest canopy, the albedo would be about 0.14 (most of the sunlight would get absorbed).

Source: Refer below figure



Q.20) When the Adiabatic lapse rate of cooling is lower than the local lapse rate, there is a condition for –

- a) Stable air
- b) Neutral
- c) Unstable air
- d) None of the above

Q.20) Solution (c)

First, we need to understand what a lapse rate is.

Lapse rate is rate of change in temperature observed while moving upward through the Earth's atmosphere (troposphere to be specific).

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The lapse rate is considered positive when the temperature decreases with elevation, zero when the temperature is constant with elevation, and negative when the temperature increases with elevation (temperature inversion).

Weather conditions at different adiabatic lapse rates

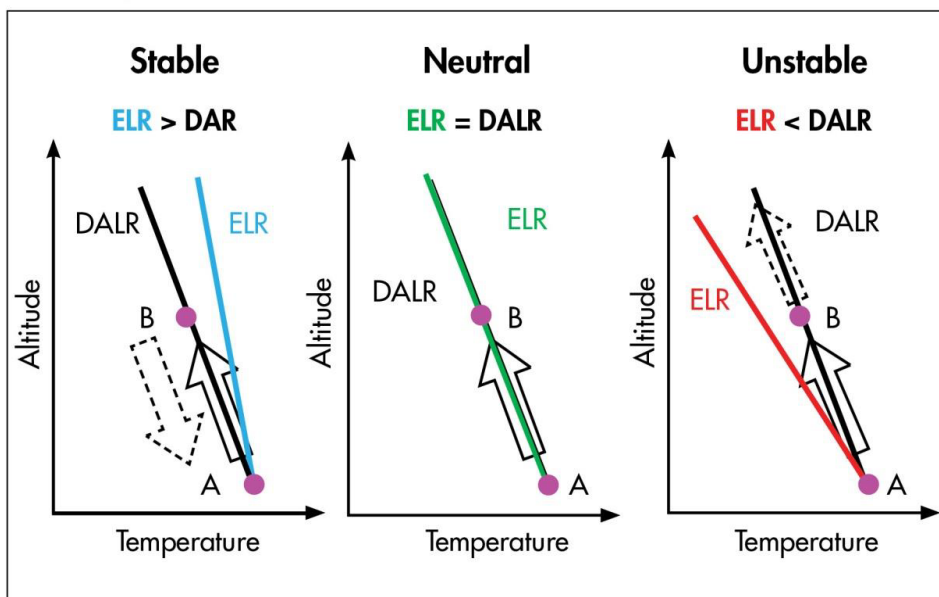
LR (Lapse Rate) = Average

Adiabatic Lapse Rate (ALR) of entire atmosphere = $6^{\circ}\text{C}/\text{km}$ [ALR of a place may be greater than or lesser than the Lapse Rate of atmosphere, i.e, it may be less than or greater than $6^{\circ}\text{C}/\text{km}$]

If ALR at a place is greater than $6^{\circ}\text{C}/\text{km}$ then it is called DALR = Less moisture than normal = more stable than normal.

If ALR at a place is lesser than $6^{\circ}\text{C}/\text{km}$ then it is called WALR = More moisture than normal = less stable than normal or instability.

Figure 2: Trajectory of a lifted parcel under different environmental lapse rates



Source: Somnath Baidya Roy

Q.21) Consider the following in regard to Fohn (Chinook) winds:

1. Fohn winds are strong, dry and warm winds which develop on the leeward side of the mountains
2. These winds are formed when descending air becomes compressed with increased pressure

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3. The winds helps animal grazing by melting snow and fastens the ripening of grapes
4. These winds are experienced in the valleys of the northern Alps, particularly in Switzerland in spring

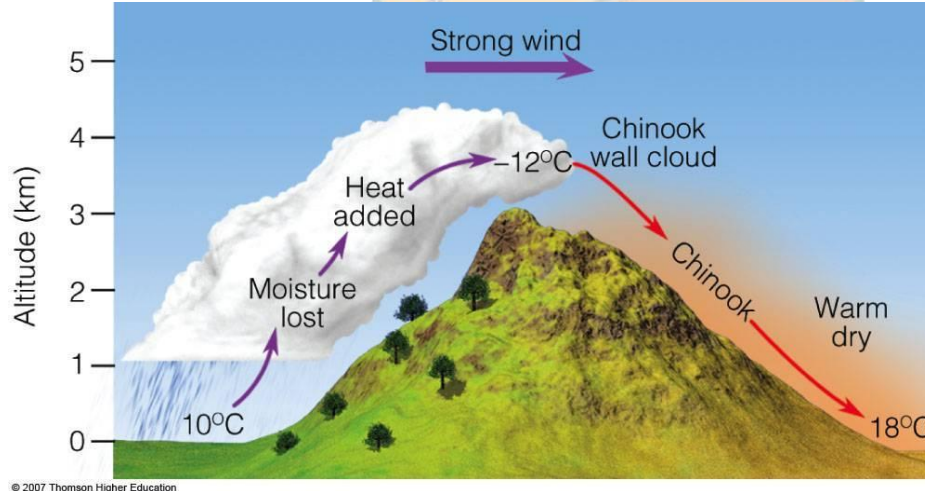
Which of the statements is/are correct?

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

Q.21) Solution (d)

Explanation:

- Self explanatory



Q.22) Consider the following characteristics:

- 1) Warm, dry summer and cool, wet winter
- 2) Shifting of wind belts
- 3) 35-75cm rainfall

Select the appropriate climatic zone/type having these characteristics:

- a) Mediterranean climate
- b) Coniferous forest Siberian climate
- c) Laurentian type
- d) Steppe/Temperate grasslands

Q.22) Solution (a)

Source: Refer Chapter 19 Mediterranean Climate, G. C. Leong

Q.23) Winter monsoons do not cause much rainfall in India because –

- a) They move from land to the sea
- b) Due to anti cyclonic circulation on land
- c) They have little humidity
- d) All of the above

Q.23) Solution (d)

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.24) Which among the following is not a warm wind?

- a) Foehn
- b) Loo
- c) Mistral
- d) Sirocco

Q.24) Solution (c)

Warm Winds include: Foehn or Fohn, Chinook, Zonda, Loo and Sirocco

Cold Winds include: Pampero, Bora, Mistral, Gregale and Tramontane

Q.25) Consider the following statements:

1. Places having same mean annual rainfall are joined by a line on map is called Isoneph.
2. Places having an equal degree of cloudiness are joined by lines known as Isohyet.
3. Places with equal sunshine duration joined by lines are known as Isohels.

Choose correct codes from the options given below:

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

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

Q.25) Solution (c)

Places having same mean annual rainfall are joined by a line on map is called Isohyet.

Places having an equal degree of cloudiness are joined by lines known as Isoneph

Places with equal sunshine duration joined by lines are known as Isohels.

Isotherm is a line on a map connecting points having the same temperature at a given time or on average over a given period.

Isobar is a line on a map connecting points having the same atmospheric pressure at a given time or on average over a given period.

Isohyte is a line on a map joining the places on the earth's surface having equal rainfall.

Isobath is an imaginary line or a line on a map or chart that connects all points having the same depth below a water surface (as of an ocean, sea, or lake)

Isohel/Isohal is an imaginary line on a map passing through places of same duration of sunshine.

Isohypse is an imaginary line passing through places having the same height from the sea level.

Isoneph is an imaginary line passing through places having same mean cloudiness over a certain period.

Isohaline is a line on a map joining points of equal salinity in an aquatic system.

Q.26) With reference to different instruments used to measure atmospheric conditions, consider the following statements:

1. Instruments used to measure direction of the wind is anemometer.
2. Instruments used to measure relative humidity is hygrometer.
3. Instruments used to measure wind speed is wind vane.

Choose correct codes from the options given below:

- a) 1 and 2 only

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

Q.26) Solution (b)

A weather vane, wind vane, or weathercock is an instrument for showing the direction of the wind. They are typically used as an architectural ornament to the highest point of a building.

A hygrometer is an instrument used for measuring the moisture content in the atmosphere or relative humidity.

An anemometer is a device used for measuring the speed of wind, and is also a common weather station instrument.

Q.27) Which among the following is/are the basic conditions for the formation of clouds?

1. There should be moisture content in air.
2. There should be stable condition of air so that air ascends.
3. There should be dust particles present in air to act as condensation nuclei so that condensation occurs.

Choose appropriate answer from the codes given below:

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

Q.27) Solution (c)

Cloud formation occurs when there is unstable air condition. As the air rises it starts cooling adiabatically. As the humidity present in it is in vapour form, it is called dry adiabatic rate. As the temperature reaches the dew point, the vapour starts condensing into small droplets forming clouds. The height which the condensation starts is called condensation limit. If the parcel is still unstable it will rise more, now because liquid water is present, it is wet adiabatic cooling. The wet adiabatic rate is higher than dry adiabatic rate.

Hence we can say the basic conditions for the formation of clouds are-

- 1) There should be moisture content in air.
- 2) There should be unstable condition of air so that air ascends.

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There should be dust particles present in air to act as condensation nuclei so that condensation occurs.

Q.28) With reference to different types of clouds and their characteristics, consider the following statements:

1. Characteristics of Halo is associated with Cumulonimbus clouds.
2. Severe thunderstorms and hail storms are associated with Cirrostratus Clouds.
3. Altocumulus clouds appear like waves in the sky and indicate fine weather.

Choose correct codes from the options given below:

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

Q.28) Solution (c)

Cirrostratus

- Characteristics of Halo is associated with Cirrostratus Clouds. Hence, statement (1) is wrong.
- Transparent, whitish veil clouds with a fibrous (hair-like) or smooth appearance. A sheet of cirrostratus which is very extensive, nearly always ends by covering the whole sky.
- A milky veil of fog (or thin Stratus) is distinguished from a veil of Cirrostratus of a similar appearance by the halo phenomena which the sun or the moon nearly always produces in a layer of cirrostratus.

Cumulonimbus

- The thunderstorm cloud, this is a heavy and dense cloud in the form of a mountain or huge tower. The upper portion is usually smoothed, fibrous or striated and nearly always flattened in the shape of an anvil or vast plume.
- Under the base of this cloud which is often very dark, there are often low ragged clouds that may or may not merge with the base. They produce precipitation, which sometimes is in the form of virga.
- Cumulonimbus clouds also produce hail and tornadoes. Hence, severe thunderstorms and hail storms are associated with Cumulonimbus clouds and not Cirrostratus clouds, hence statement (2) is wrong.

Alto cumulus

- White and/or gray patch, sheet or layered clouds, generally composed of laminae (plates), rounded masses or rolls. They may be partly fibrous or diffuse.
- When the edge or a thin semitransparent patch of alto cumulus passes in front of the sun or moon a corona appears. This colored ring has red on the outside and blue inside and occurs within a few degrees of the sun or moon.
- The most common mid cloud, more than one layer of Alto cumulus often appears at different levels at the same time. Many times Alto cumulus will appear with other cloud types.
- Alto cumulus clouds appear like waves in the sky and indicate fine weather. Hence, statement (3) is correct.

Q.29) Consider the following statements:

1. Aurora Australis is the phenomenon of beams of many coloured lights in the Southern Hemisphere.
2. Aurora Borealis is the phenomenon of beams of many coloured lights in the Northern Hemisphere.
3. Auroras are caused when energetic electrically charged particles released from the sun that enter the earth's atmosphere collide with gas atoms.

Which of the statements given above is/are correct?

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

Q.29) Solution (d)

The Aurora is an incredible light show caused by collisions between electrically charged particles released from the sun that enter the earth's atmosphere and collide with gases such as oxygen and nitrogen. The lights are seen around the magnetic poles of the northern and southern hemispheres.

Bottom line: When charged particles from the sun strike atoms in Earth's atmosphere, they cause electrons in the atoms to move to a higher-energy state. When the electrons drop back to a lower energy state, they release a photon: light. This process creates the beautiful aurora.

Q.30) With reference to Jet Streams, consider the following statements:

1. Jet streams are long meandering waves moving at the upper atmosphere, strong at 30° to 60° latitude.
2. The jet streams on Earth typically run from west to east.
3. Temperature influences the velocity of the jet stream, they are more active in winter.
4. Both the Northern and Southern hemispheres have jet streams.

Which of the statements given above is/are correct?

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

Q.30) Solution (d)

Jet streams are like rivers of wind high above in the atmosphere. These slim strips of strong winds have a huge influence on climate, as they can push air masses around and affect weather patterns.

The jet streams on Earth — other planets have jet streams as well, notably Jupiter and Saturn — typically run from west to east, and their width is relatively narrow compared to their length. Jet streams are typically active at 20,000 feet (6,100 meters) to 50,000 feet (9,144 meters), or about 7 miles (11 kilometers) above the surface and travel in what is known as the troposphere of Earth's multi-layered atmosphere.

The seasons of the year, location of low and high pressure systems and air temperature all affect when and where a jet stream travels. Jet streams form a border between hot and cold air. Because air temperature influences jet streams, they are more active in the winter when there are wider ranges of temperatures between the competing Arctic and tropic air masses.

Temperature also influences the velocity of the jet stream. The greater the difference in air temperature, the faster the jet stream, which can reach speeds of up to 250 mph (402 kph) or greater, but average about 110 mph (177 kph).

Both the Northern and Southern hemispheres have jet streams, although the jet streams in the north are more forceful. Each hemisphere has two primary jet streams — a polar and a subtropical. The polar jet streams form between the latitudes of 50 and 60 degrees north and south of the equator, and the subtropical jet stream is closer to the equator and takes shape at latitudes of 20 to 30 degrees.

Q.31) Select the appropriate climatic zone/type having the below given characteristics:

1. The climate has highest concentration of winter rainfall.
2. It is found in the sub-tropics.
3. It is associated with the shifting of Global pressure belts.
4. It is found in all the inhabited continents of the world.

The referred climate is

- a) Mediterranean climate
- b) Tropical and Temperate deserts
- c) Tropical grasslands
- d) Steppe/Temperate grasslands

Q.31) Solution (a)

Explanation:

Characteristics of Mediterranean climate:

- Entirely confined to the western portion of continental masses, between 30° and 45° north and south of the equator (i.e. sub-tropical region).
- The basic cause of this type of climate is the shifting of the wind belts or global pressure belts.
- Mediterranean Sea has the greatest extent of this type of 'winter rain climate', and gives rise to the name Mediterranean Climate.
- The best developed form of this climatic type is found in central Chile.
- Clear skies and high temperatures; hot, dry summers and cool, wet winters.
- Mean annual precipitation ranges from 35 - 90 cm.
- Temperature of warmest month greater than or equal to 10° C.
- Temperature of coldest month is less than 18° C but greater than -3° C
- Climate is not extreme because of cooling from water bodies.



Q.32) Which of the following is/are true about Convectional rainfall?

1. It occurs in the areas of intense heat and abundant moisture.
2. Solar radiation is the main source of heat to produce convectional currents in air.

Choose correct code from the options given below:

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

Q.32) Solution (c)

On the basis of mode of occurrence, the rainfall can be classified into three categories:

i) Convectional rainfall: it occurs in the areas of intense heat and abundant moisture. Solar radiation is the main source of heat to produce convectional currents in air. The belt of doldrums and equatorial region generally records this type of rainfall. This type of rainfall is not much effective for crops as most of the water is drained off in the form of surface drainage.

ii) Orographic rainfall: This type of rainfall occurs from vertical uplift of an air stream by the topographic barriers. This type of rainfall occurs on the windward side of the mountain ranges. On windward side also the amount of rainfall starts decreasing after certain height.

iii) **Cyclonic or frontal rainfall:** cyclonic rainfall occurs when deep and extensive air masses converge and move upward which lead to their adiabatic cooling. We will discuss about cyclones in further details.

Q.33) Consider the following statements with regard to process of hydrological cycle:

1. Evaporation, transpiration, infiltration and condensation are the mechanisms by which water from the oceans reaches the atmosphere.
2. Maritime air masses carry a large amount of moisture than the continental air masses.

Which of the statements given above is/are correct?

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

Q.33) Solution (b)

The hydrological cycle involves several processes and these processes result in the movement of water from the ocean to the atmosphere and back to the ocean. These processes include: evaporation, transpiration, air mass movements, condensation, precipitation, infiltration, surface-run off and underground water behaviour.

However, it should be noted that Evaporation is the only mechanism by which water from the oceans reaches the atmosphere.

Equally important is the role of evaporation from other bodies such as vegetation, soil, rivers, ponds, lakes and even from the falling rain.

Over the world, evaporation is always greater over the oceans than over the continents, as over the oceans there is no dearth of water to evaporate.

Both maritime air masses and continental air masses carry moisture, but the maritime air masses moving from the oceans to the continents carry a large amount of moisture than the continental air masses moving from the continents to the oceans.

Q.34) Consider the below statements:

1. Porosity refers to the capacity of a rock to allow water to flow through it.
2. Permeability refers to the water-holding capacity of the rock material and a permeable rock does not necessarily allow water to flow through it.

Which of the statements given above is/are correct?

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

Q.34) Solution (d)

Porosity

Porosity is an intrinsic property of every material. It refers to the amount of empty space within a given material. In a soil or rock the porosity (empty space) exists between the grains of minerals. In a material like gravel the grains are large and there is lots of empty space between them since they don't fit together very well. However, in a material like a gravel, sand and clay mixture the porosity is much less as the smaller grains fill the spaces. The amount of water a material can hold is directly related to the porosity since water will try and fill the empty spaces in a material. We measure porosity by the percentage of empty space that exists within a particular porous media.

In simple words, *porosity* stands for water-holding capacity of the rock material and a porous rock does not necessarily allow water to flow through it.

Permeability

Permeability is another intrinsic property of all materials and is closely related to porosity. Permeability refers to how connected pore spaces are to one another. If the material has high permeability then pore spaces are connected to one another allowing water to flow from one to another, however, if there is low permeability then the pore spaces are isolated and water is trapped within them. For example, in a gravel all of the pores well connected one another allowing water to flow through it, however, in a clay most of the pore spaces are blocked, meaning water cannot flow through it easily.

In simple words, permeability refers to the capacity of a rock to allow water to flow through it.

Q.35) A flat, largely featureless part of the ocean floor between the mid-ocean ridge and the continental rise is called –

- a) Abyssal Plain
- b) Seamount
- c) Oceanic (Volcanic) Island

d) Gyre

Q.35) Solution (a)

Abyssal Plain - A flat, largely featureless part of the ocean floor between the mid-ocean ridge and the continental rise.

Seamount - A submarine mountain (usually volcanic) that rises 1 km or more above the sea-floor (Example: Emperor Seamount chain). Most form above a mantle plume.

Oceanic (Volcanic) Island - A seamount that rises above sea level (Example: Hawaiian Islands). Most form above a mantle plume.

Atoll - A circular coral reef that forms a ring of islands around a central lagoon. Form in shallow water on the flanks of a submerging oceanic island.

Deep Ocean Trenches - Most occur along subduction zones. Previously discussed under 'Plate Tectonics'.

Q.36) Consider the below statements with regard to Neap Tide:

1. It occurs when the Earth, Sun and Moon are aligned.
2. Results in greatest variation between high and low tides.
3. Neap tides occur during the first and third quarter moon, when the moon appears "half full."

Which of the statements given above is/are correct?

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

Q.36) Solution (b)

Tides are long-period waves that roll around the planet as the ocean is "pulled" back and forth by the gravitational pull of the moon and the sun as these bodies interact with the Earth in their monthly and yearly orbits.

During full or new moons—which occur when the Earth, sun, and moon are nearly in alignment—average tidal ranges are slightly larger. This occurs twice each month. The moon appears new (dark) when it is directly between the Earth and the sun. The moon appears full when the Earth is between the moon and the sun. In both cases, the gravitational pull of the

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sun is "added" to the gravitational pull of the moon on Earth, causing the oceans to bulge a bit more than usual. This means that high tides are a little higher and low tides are a little lower than average.

These are called spring tides, a common historical term that has nothing to do with the season of spring. Rather, the term is derived from the concept of the tide "springing forth." Spring tides occur twice each lunar month all year long, without regard to the season.

Seven days after a spring tide, the sun and moon are at right angles to each other. When this happens, the bulge of the ocean caused by the sun partially cancels out the bulge of the ocean caused by the moon. This produces moderate tides known as neap tides, meaning that high tides are a little lower and low tides are a little higher than average. Neap tides occur during the first and third quarter moon, when the moon appears "half full."

In simple words,

Spring Tide - Occurs when the Earth, Sun and Moon are aligned (full moon, new moon). Results in greatest variation between high and low tides.

Neap Tide - Occurs when the Moon is 90° out of alignment with the Sun and Earth (first quarter moon, third quarter moon). Results in smallest variation between high and low tides.

Q.37) Consider the following statements:

1. Gujarat is the only state which is both emergent and submergent
2. Eastern coast is emergent in nature (barring the Coromandel coast), whereas western coast is submergent (barring the Malabar)
3. The land advancing against sea is termed a positive movement and the sea advancing against land is known as a negative movement

Which of the statements given above is/are correct?

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

Q.37) Solution (b)

A negative movement occurs when there is an *uplift of land* or a *fall in sea level*.

A positive movement occurs when there is *depression of land* or a *rise in sea level*.

Q.38) Open-stunted forest with bushes and small trees having long roots and sharp thorns or spines are commonly found in

- a) Eastern Orissa
- b) North-eastern Tamil Nadu
- c) Shiwaliks and Terai regions
- d) Western Andhra Pradesh

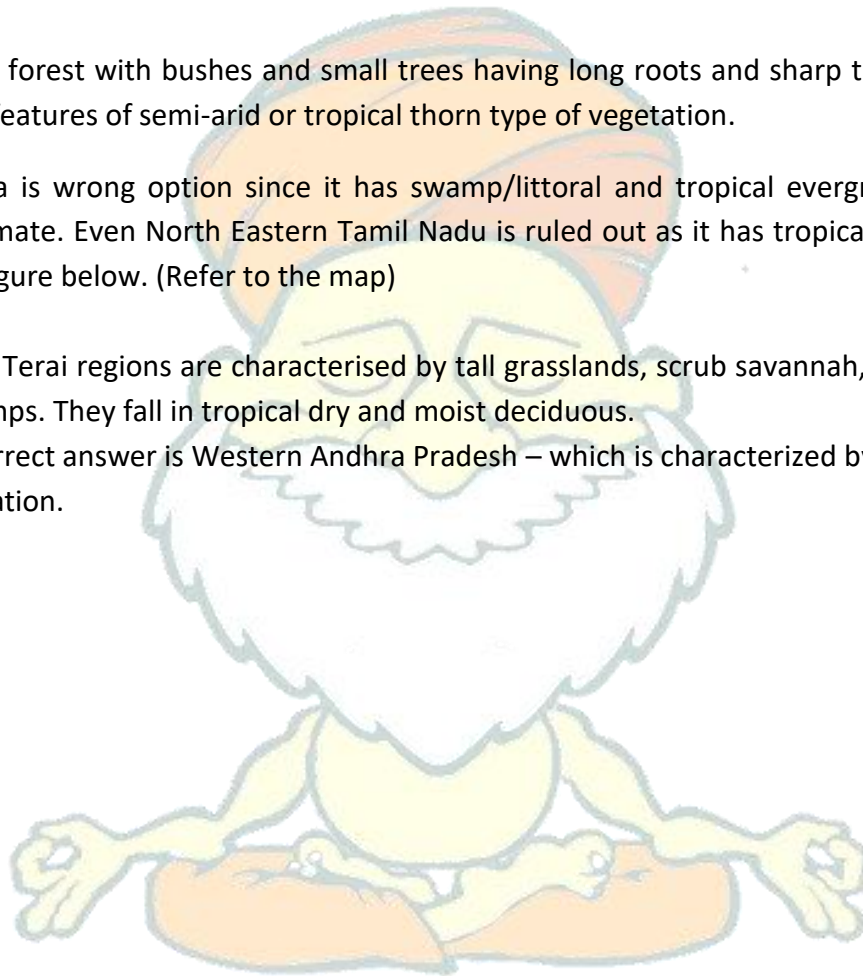
Q.38) Solution (d)

Open-stunted forest with bushes and small trees having long roots and sharp thorns or spines are common features of semi-arid or tropical thorn type of vegetation.

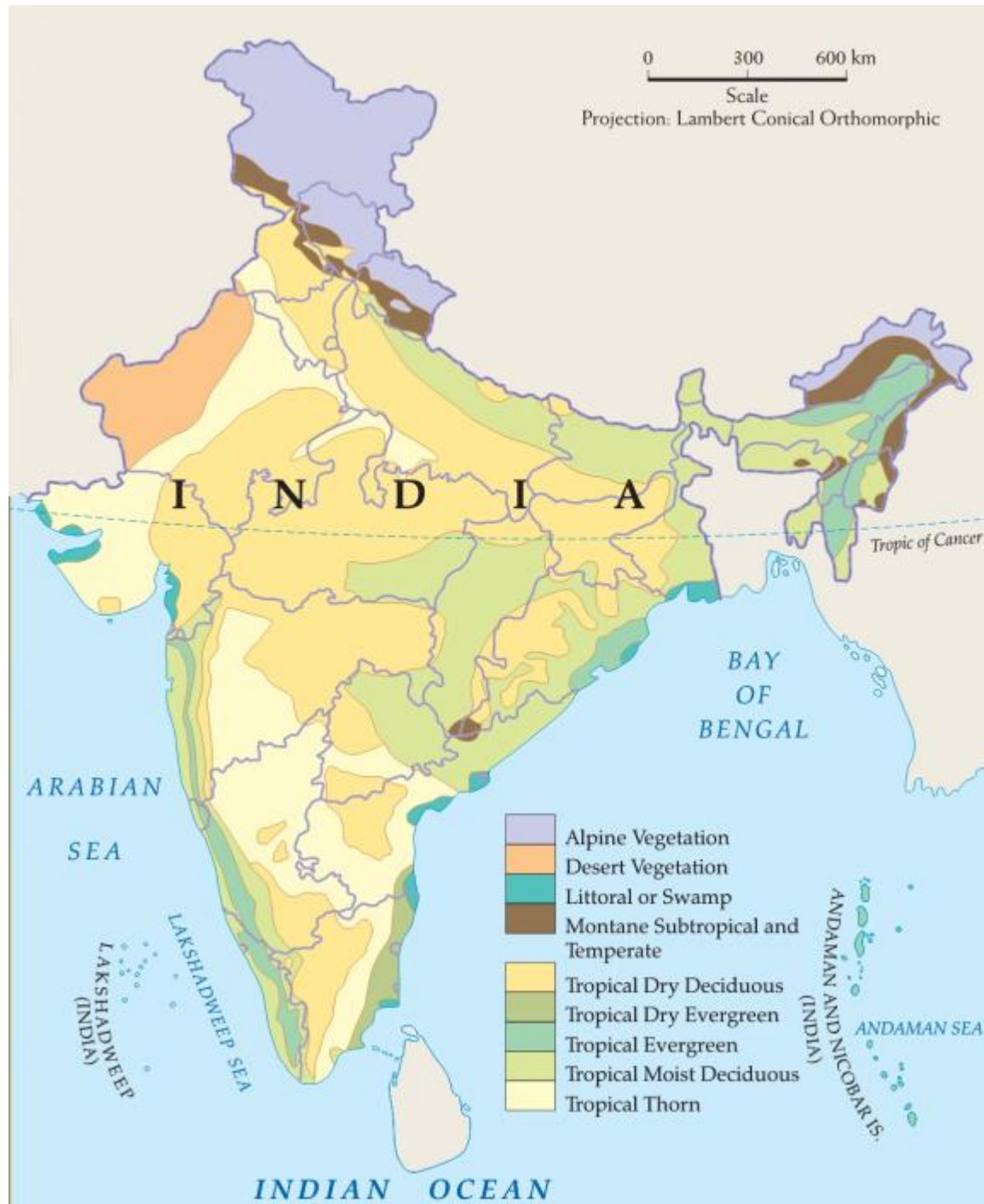
Eastern Orissa is wrong option since it has swamp/littoral and tropical evergreen and moist deciduous climate. Even North Eastern Tamil Nadu is ruled out as it has tropical dry evergreen as shown in figure below. (Refer to the map)

Shiwaliks and Terai regions are characterised by tall grasslands, scrub savannah, sal forests and clay rich swamps. They fall in tropical dry and moist deciduous.

Therefore, correct answer is Western Andhra Pradesh – which is characterized by Tropical thorn type of vegetation.



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Q.39) Near the shores Mangroves grow best in:

- a) Inter-tidal zone
- b) Intra-tidal zone
- c) Extra-tidal zone
- d) None of the above

Q.39) Solution (a)

The intertidal area (also called the littoral zone) is where the land and sea meet, between the high and low tide zones. This complex marine ecosystem is found along coastlines worldwide. It is rich in nutrients and oxygen and is home to a variety of organisms.

- This zone is the area that is exposed to the air at low tide and flooded at high tide.
- The term “mangrove” refers to an assemblage of tropical trees and shrubs that grows in the intertidal zone.
- Mangroves are able to live in the intertidal zone because they are special plants with special organs that help them to live in salty surroundings and in poor soil.

Q.40) Match List I with List II and select the correct answer using the code given below the Lists:

List I

(Ocean Current)

- A. Guinea current
- B. Oyashio current
- C. Canaries current
- D. Kuroshio current

List II

(Location in Map)

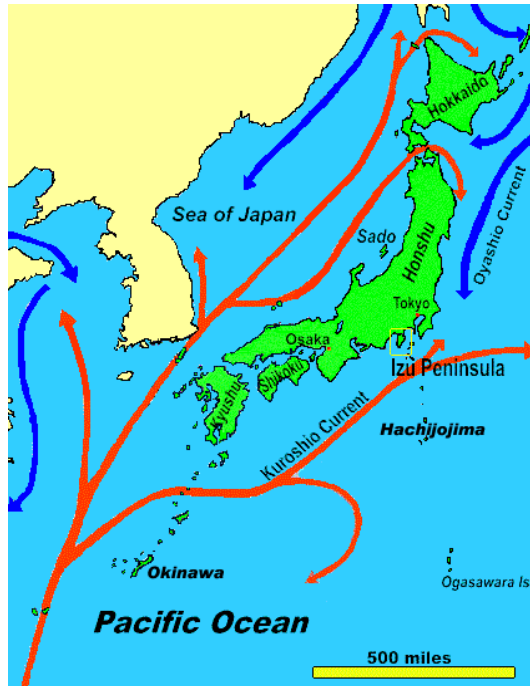


Code:

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

Q.40) Solution (b)

Explanation:



Q.41) Consider the following:

1. These forests are the most wide spread forests of India.
2. These regions experience seasonal changes.
3. Hardwood trees such as sal, teak, neem and shisham are found in this region.

The above given characteristic features belong to –

- a) Tropical Evergreen Forests
- b) Tropical Deciduous Forests
- c) Temperate Evergreen Forests
- d) Temperate Deciduous Forests

Q.41) Solution (b)

Features of Tropical Deciduous Forests

Vegetation:

- Tropical deciduous are the monsoon forests found in the large part of India, northern Australia and in central America.
- These forests are the most wide spread forests of India.
- These regions experience seasonal changes. Trees shed their leaves in the dry season to conserve water.

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- They spread over areas of annual rainfall ranging between 200 cm and 70 cm.
- The hardwood trees found in these forests are sal, teak, neem and shisham. Hardwood trees are extremely useful for making furniture, transport and constructional materials.
- Tigers, lions, elephants, langoors and monkeys are the common animals of these regions.

Q.42) Which of the below given are conditions that favour the formation of deltas?

1. Shallow sea, adjoining the delta
2. Strong current at the river mouth which leads to formation of tides
3. Active vertical and lateral erosion in the lower course of the river to supply large amount of sediments

Choose the correct answer from the code below:

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

Q.42) Solution (a)

The following conditions favour the formation of deltas:

1. active vertical and lateral erosion in the upper course of the river to supply large amount of sediments;
2. tideless, sheltered coast;
3. shallow sea, adjoining the delta;
4. no strong current at the river mouth which may wash away the sediments.

Q.43) Consider the following statements:

1. Erosion is distinguished from weathering as no transportation of material is involved in case of erosion.
2. Abrasion is the process of gradual destruction of rocks through physical, chemical and biological processes caused by wind, water, climate change etc.

Which of the above statement(s) is/are correct?

- a) 1 only
- b) 2 only

- c) Both 1 and 2
- d) Neither 1 nor 2

Q.43) Solution (d)

Weathering is the process of gradual destruction of rocks at or near the earth's surface through physical, chemical and biological processes caused by wind, water, climate change etc.

Erosion is the process of gradual transportation of weathered rock materials through natural agencies like wind, river, streams, glaciers etc.

Weathering is distinguished from Erosion as no transportation of material is involved in case of weathering.

Q.44) Consider the following statements:

1. It is governed by topography.
2. Large changes in mean temperature occur over short distances.
3. Precipitation types and intensity also vary spatially.

The above characteristics are related with which of the following climate type?

Select the correct code:

- a) Polar Climates
- b) Cold Snow Forest Climates
- c) Highland Climates
- d) Tundra Climate

Q.44) Solution (c)

Highland climates are governed by topography. In high mountains, large changes in mean temperature occur over short distances. Precipitation types and intensity also vary spatially across high lands. There is vertical zonation of layering of climatic types with elevation in the mountain environment.

Q.45) Consider the following:

1. Mesas and Buttas are associated with arid areas.
2. Peneplains are associated with humid conditions.
3. Dissected plateaux are associated with humid areas.

Which of the statements given above is/are correct?

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

Q.45) Solution (d)

Mesas and Buttas are associated with arid areas, whereas Dissected plateaux are associated with humid areas.

Peneplains are associated with humid conditions, whereas Pediplains are associated with arid and semi-arid conditions.

Q.46) The prerequisite condition for the formation of artesian well are -

1. Layer of permeable rock lying between two impermeable rock layers so that water does not get escape.
2. The permeable rock should be exposed at the ground surface, so that rock can soak rainwater.
3. Structure of rock strata must be synclinal.

Select the correct code:

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

Q.46) Solution (d)

The geologic conditions necessary for an artesian well are an inclined aquifer sandwiched between impervious rock layers above and below that trap water in it. Water enters the exposed edge of the aquifer at a high elevation and percolates downward through interconnected pore spaces.

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Q.47) The Tank irrigation is practised mainly in the peninsular region due to which of the following reasons?

1. The undulating relief and hard rocks make it difficult to dig canals and wells in peninsular region.
2. There is little percolation of rainwater due to hard rock structure and ground water is not available in large quantity.
3. The clustered nature of population and agricultural fields also favours tank irrigation there.
4. There are several streams which become torrential during rainy season and way to make best use of this water is to impound it by constructing bunds and building tanks.

Select the correct code:

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

Q.47) Solution (b)

Mostly prevalent in uneven and relatively rocky plateau of peninsular India, tanks are a popular method of irrigation in the states of T.N., Karnataka, Andhra Pradesh and Maharashtra. The scattered nature (not clustered nature) of population and agricultural fields also favours tank irrigation.

Q.48) Match the following in correct sequence:

<i>Land forms</i>	<i>Features</i>
1. Rivers	A) Stalagmite
2. Desert	B) Truncated spurs
3. Glacier	C) Stump
4. Karsts	D) Wadi
	E) Spurs

Codes:

1-2-3-4

- a) E-D-C-A
- b) A-D-B-E

- c) E-D-B-A
- d) A-C-D-B

Q.48) Solution (b)

Rivers : : Spurs

Desert : : Wadi

Glacier : : Truncated spurs

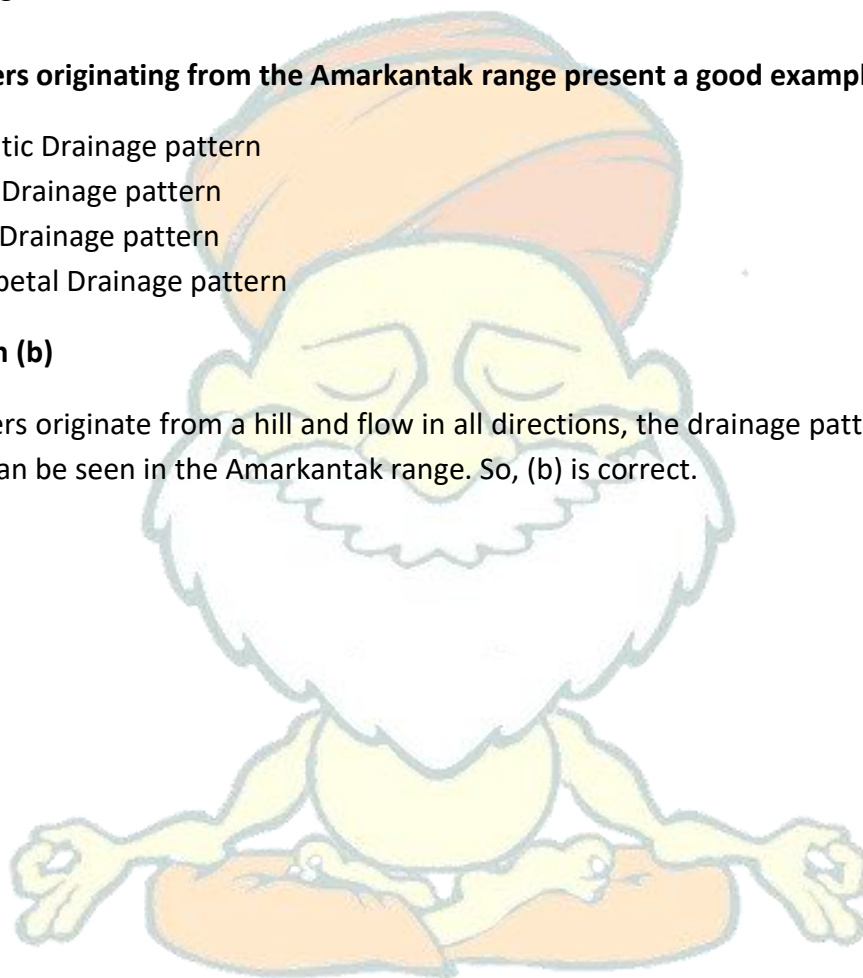
Karsts : : Stalagmite

Q.49) The rivers originating from the Amarkantak range present a good example of

- a) Dendritic Drainage pattern
- b) Radial Drainage pattern
- c) Trellis Drainage pattern
- d) Centripetal Drainage pattern

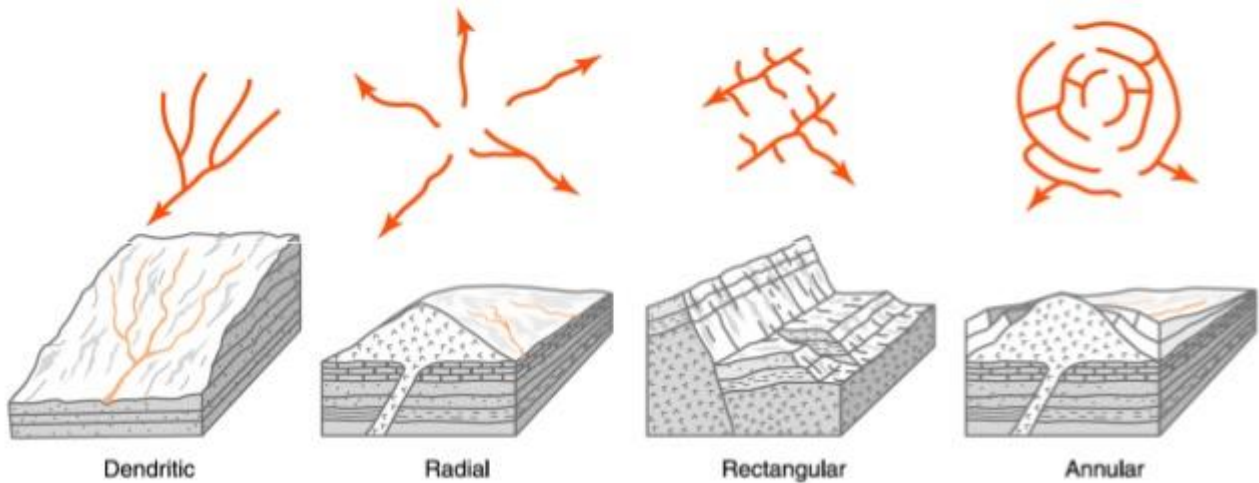
Q.49) Solution (b)

When the rivers originate from a hill and flow in all directions, the drainage pattern is known as 'radial'. This can be seen in the Amarkantak range. So, (b) is correct.



TYPES OF DRAINAGE PATTERNS

- **Dendritic drainage pattern:** it is also common where the rock layers are horizontal.
- **Rectangular drainage pattern:** A region that has prominent parallel and perpendicular faults, repeated folds, or a strong rectangular jointing pattern will display a rectangular drainage pattern.
- **Radial drainage pattern:** occurs in an eroded dome. A radial drainage pattern resembles the spokes of a wheel.
- **Annular drainage pattern:** Annular drainage is a pattern of concentric circles that are connected by short radial stream segments.



Q.50) Which of the factors influence the origin and nature of ocean currents?

1. Difference in density
2. Temperature
3. Salinity
4. Earth's rotation
5. Winds

Choose the correct answer:

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

Q.50) Solution (d)

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As we all know, the density of sea water varies from place to place according to its temperature and proportion of salinity. The density increases with an increase in salinity and decreases with a decrease in salinity. But when the temperature increases, density decreases and when the temperature decreases density increases.

This increase and decrease in density due to the differences in temperature and salinity causes the water to move from one place to another.

Earth's rotation causes Coriolis force which deflects the air to its right in the northern hemisphere and to its left in the southern hemisphere-Ferrel's Law.

Similarly, oceans water also affected by the Coriolis force and follows the Ferrel's Law.

Hence, ocean currents in the northern hemisphere move in a clockwise (towards right) direction and ocean currents in southern hemisphere moves in an anti-clockwise (towards left) direction.

The winds like trade winds and westerlies drive the ocean water in a steady flow in front of them. When the direction of the winds changes, the direction of the current also gets changed.

Hence, Solution (d) – All of the factors provided above influence the origin and nature of ocean currents.

Q.51) Consider the following:

1. Gyres are spiraling circulations thousands of miles in diameter and rimmed by large, permanent ocean currents.
2. Eddies are smaller, temporary loops of swirling water that can travel long distances before dissipating.

Which of the statements given above is/are correct?

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

Q.51) Solution (c)

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Even on the calmest days, Earth's oceans are constantly on the move. At the surface and beneath, currents, gyres and eddies play a crucial role in physically shaping the coasts and ocean bottom; in transporting and mixing energy, chemicals and other materials within and among ocean basins; and in sustaining countless plants and animals that rely on the oceans for life—including humans.

These features are important components of Earth's global ocean circulation that move water mainly horizontally. Their effects can also extend down for miles, in some places reaching the ocean bottom.

Currents are coherent streams of water moving through the ocean and include both long, permanent features such as the Gulf Stream, as well as smaller, episodic flows in both coastal waters and the open ocean. They are formed primarily by wind blowing across the surface of the ocean and by differences in the temperature, density and pressure of water and are steered by Earth's rotation as well as the location of the continents and topography of the ocean bottom.

Gyres are spiraling circulations thousands of miles in diameter and rimmed by large, permanent ocean currents.

Eddies are smaller, temporary loops of swirling water that can travel long distances before dissipating. They are relatively small, contained pockets of moving water that break off from the main body of a current and travel independently of their parent. They can form in almost any part of a current, but are especially pronounced in western boundary currents.

Q.52) *Purvachal* or the Eastern hills and mountains comprises

1. Naga Hills
2. Patkai Hills
3. Dafla Hills
4. Lushai Hills

Choose the correct answer from the code given below:

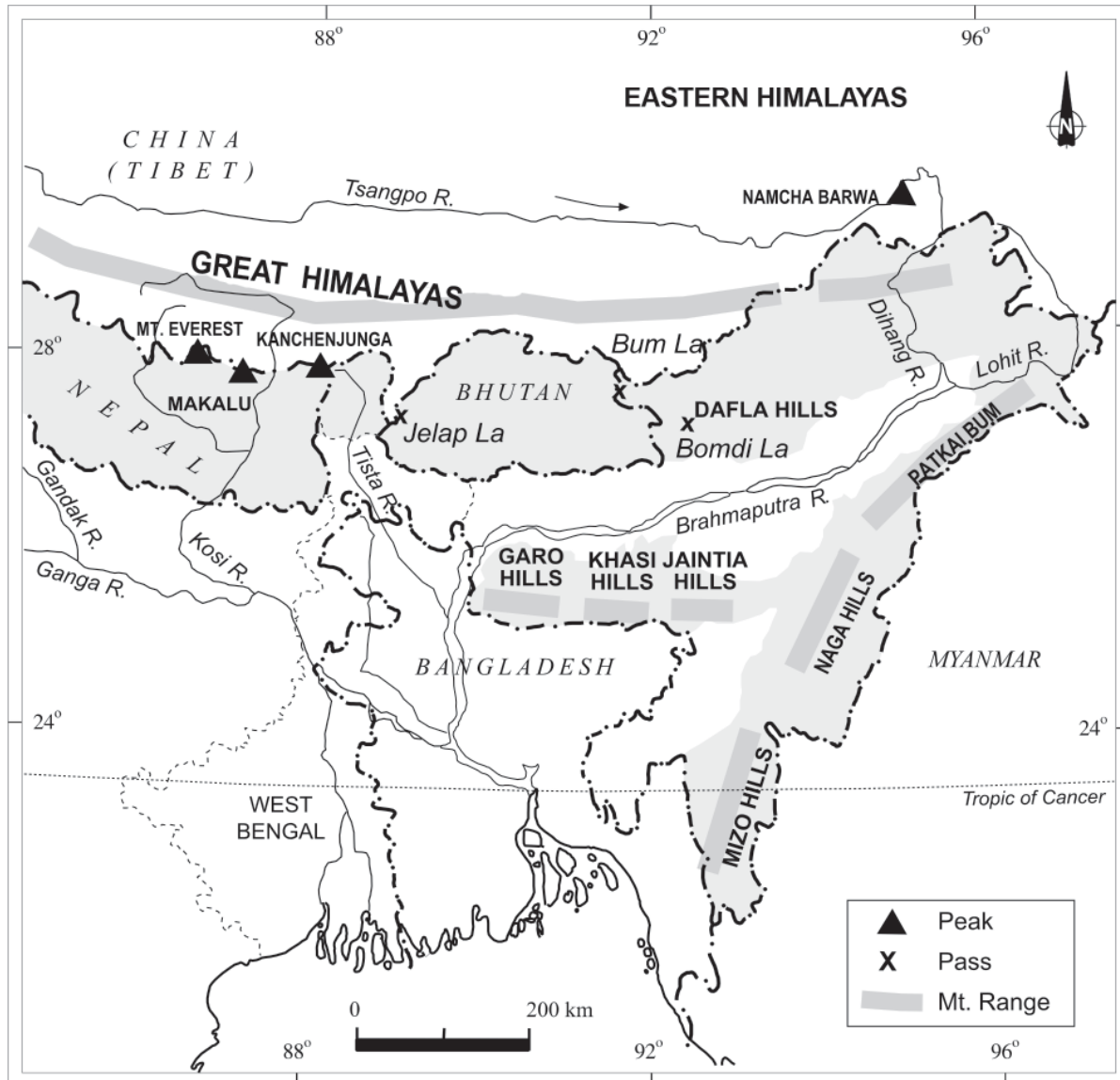
- a) 1, 2 and 3 only
- b) 1, 2 and 4 only
- c) 1 and 2 only
- d) 2 and 4 only

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Q.52) Solution (b)

The *Purvachal* comprises the Patkai hills, the Naga hills, Manipur hills and the Mizo hills.

Purvachal or the Eastern hills and mountains are part of the Himalayan mountain system having their general alignment from the north to the south direction.



Q.53) Consider the below statements with regard to Western Ghats and Eastern Ghats:

1. The mean height of the Western Ghats is more than that of Eastern Ghats.
2. The Eastern Ghats do not form a continuous chain like the Western Ghats.
3. The Eastern Ghats average width is less than that of Western Ghats.

Which of the statements given above is/are correct?

- a) 1 and 2 only
- b) 2 and 3 only
- c) 1, 2 and 3
- d) None

Q.53) Solution (a)

Statement (3) is incorrect as the Western Ghat's average width is 50 to 80 km. But Eastern Ghats width varying from 100 to 200 km.

Western Ghats is continuous and can be crossed through passes only. But Eastern Ghats has been divided into several parts by large rivers.

Western Ghats average elevation is 900 to 1,100 meters above sea-level. But the average elevation of Eastern Ghats is about 600 metres above sea level.

Q.54) Consider the following characteristic features about Bhabar:

1. It is the largest part of Northern plain.
2. It contains calcareous deposits locally known as 'Kankar '.
3. Bhabar consists of old alluvial deposits, whereas Khadar consists of new alluvial deposits.

Which of the statements given above is/are correct?

- a) 3 only
- b) 2 and 3 only
- c) 1 and 2 only
- d) None

Q.54) Solution (d)

All the characteristic features provided in the statements is about Bhangar, hence none of the statements are correct with regard to Bhabar.

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. It comprises of

pebble- studded rocks in the shape of porous beds. Due to porosity of the rocks, the streams disappear and flow underground. This region is not much suitable for agriculture.

South of the Bhabar is the Tarai belt and south of Tarai is a belt consisting of old and new alluvial deposits known as the Bhangar and Khadar respectively.

Q.55) Why Western Ghats in Karnataka receive more monsoon rainfall than Maharashtra and Kerala?

1. Due to continuous topography of the Ghats in Karnataka.
2. Due to the greater width of the mountains in Karnataka.
3. Mountains of Karnataka have very steep slopes.

Choose the correct answer from the code given below:

- a) 1 and 2 only
- b) 1 and 3 only
- c) 1, 2 and 3
- d) None

Q.55) Solution (a)

Western Ghats in Karnataka receive more monsoon rainfall than Maharashtra and Kerala. There are several reasons for this.

First, the mountain topography in Karnataka is broader than the narrow topography of the Ghats in Maharashtra. Due to the greater width of the mountains, the rain bearing winds have to necessarily travel a longer distance and have more time for the drops to coalesce and precipitate as rainfall, resulting in higher rainfall. In contrast, the narrow width of the Ghats in Maharashtra allows the rain-bearing wind to cross over to the leeward side rapidly before precipitation can occur.

As for Kerala, the Ghats there are in the form of isolated mountains, where the rain-bearing winds can easily cross over to the leeward side through the gaps in between without precipitation occurring.

Second, the slope of the mountain has a direct bearing on the possibility of precipitation. This is borne out by the Ghats of Karnataka where the mountains are gently sloping, compared to the steep slopes of the Ghats in Maharashtra and Kerala.

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The air parcel will retain its energy and speed for a longer time when the slope is gradual. This will provide sufficient vertical motion to cloud droplets to grow by collision–coalescence process and hence form precipitation.

Third, the gentle slope provides a greater area for sunlight absorption and heating leading to greater convection when compared with an abrupt slope i.e. less Ghat area such as that of the Maharashtra and Kerala Ghats.

Fourth, the continuous mountain range presents a greater barrier to rain-bearing winds than a range comprising isolated mountains with gaps in between where the winds can easily pass to the leeward side. Unlike in the case of Kerala, the Ghats in Maharashtra and Karnataka are continuous.

Q.56) Which of the statements given below is/are not true in regard to western coastal plain?

- a) It is a narrow belt.
- b) Eastern coastal plain receives comparatively low rainfall but the Western coastal plain receives heavy rainfall.
- c) West Coast Plain is infertile and agriculturally not prosperous except in the Malabar Coast.
- d) It is an example of emergent coastal plain.

Q.56) Solution (d)

Western coastal plain is an example of submerged coastal plain (not emergent). It provides natural conditions for development of ports.

Q.57) Which of the statements given below is/are correct about Terai region?

- 1. Terai is an ill-drained, damp (marshy) and thickly forested narrow tract to the south of Bhabar running parallel to it.
- 2. It is a swampy lowland with silty soils.
- 3. Terai soils are rich in phosphate and organic matter but are deficient in nitrogen.

Choose the correct answer from the code given below:

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

Q.57) Solution (b)

Terai is an ill-drained, damp (marshy) and thickly forested narrow tract (15-30 km wide) to the south of Bhabar running parallel to it.

The underground streams of the Bhabar belt re-emerge in this belt. It is a swampy lowland with silty soils.

The terai soils are rich in nitrogen and organic matter but are deficient in phosphate.

These soils are generally covered by tall grasses and forests but are suitable for a number of crops such as wheat, rice, sugarcane, jute etc.. This thickly forested region provides shelter to a variety of wild life.

Q.58) Consider the following about Laterite Soils and select the incorrect statement:

- a) They are formed under conditions of high temperature and heavy rainfall with alternate wet and dry periods.
- b) They are rich in bauxite or ferric oxides.
- c) They are fertile and suitable for growing plantation crops like tea, coffee, rubber.
- d) They are found on the summits of Western Ghats and Eastern Ghats.

Q.58) Solution (c)

Laterite Soils are formed under conditions of high temperature and heavy rainfall with alternate wet and dry periods. (especially Monsoonal regions)

Heavy rainfall promotes leaching (nutrients gets washed away by water) of soil whereby lime and silica are leached away and a soil rich in oxides of iron and aluminium compounds is left behind. They lack fertility due to intensive leaching.

Q.59) Natural vegetation in tropical rainforest is luxuriant, because of –

- 1. Seasonal change which facilitates nutrient absorption.
- 2. Hot and wet climate throughout the year.
- 3. Fertile soil.
- 4. Rapid nutrient cycling.

Choose the correct answer from the code given below:

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

Q.59) Solution (b)

Soil in tropical rainforests is very poor, they are highly acidic and low in minerals and nutrients. If the soil is so poor in tropical rain forests, how does such a dense array of shrubs and trees grow there?

The key to the luxuriant vegetation of these forests lies in the rapid nutrient cycling of the rainforest.

In the rainforest, most of the carbon and essential nutrients are locked up in living vegetation, dead wood, and decaying leaves. As organic material decays, it is recycled so quickly that few nutrients ever reach the soil, leaving it nearly infertile or sterile.

The tropical rainforest is a biome with a constant temperature and a high rainfall. The level of humidity and density of the vegetation give the ecosystem a unique water and nutrient cycle.

Because of the lack of seasonal differences, due to the geographical location of the forests, and the high humidity level the vegetation is luxuriant here.

Q.60) Consider the below statements with regard to Himalayan and Peninsular river system:

1. Peninsular rivers are not as long as the Himalayan rivers.
2. Peninsular rivers are smaller in number, whereas Himalayan rivers are larger in number.
3. Himalayan rivers follow more or less straight course and do not change their course.
4. Peninsular rivers are useful for irrigation and navigation.

Which of the statements given above is/are correct?

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

Q.60) Solution (a)

GEOGRAPHY

The Himalayan River System	The Peninsular River System
<ol style="list-style-type: none">1. Some of the longest rivers belong to the Himalayan river system.2. The catchment areas and basins of the Himalayan rivers are very large.3. Himalayan rivers are larger in number.4. The Himalayan rivers originate from the snow covered areas and receive water from rainfall as well from snow-melt. Therefore, they are perennial.5. The Himalayan rivers form deep gorges.6. The Himalayan rivers form river meanders and often change their course.7. These rivers are useful for irrigation and navigation.8. These rivers flow across the young fold mountains and are still in a youthful stage.	<ol style="list-style-type: none">1. Peninsular rivers are not as long as the Himalayan rivers.2. The catchment areas and basins of the Peninsular rivers are of comparatively smaller size.3. Peninsular rivers are smaller in number.4. The Peninsular rivers depend entirely upon rain water and are seasonal.5. The Peninsular rivers flow in shallow valleys.6. The Peninsular rivers follow more or less straight course and do not change their course.7. These rivers are not suited for irrigation and navigation.8. These rivers have been flowing in one of the oldest plateaus of the world and have reached maturity.

