Class 11 Geography NCERT Solutions Chapter 11 Water in the Atmosphere

Class 11 Geography Chapter 11 NCERT Textbook Questions Solved

1. Multiple choice questions.

Question 1(i).
Which one of the following is the most important constituent of the atmosphere for human beings?
(a) Water vapour
(b) Nitrogen
(c) Dust particle
(d) Oxygen.
Answer:
(a) Water vapour

Question 1(ii).
Which one of the following process is responsible for transforming liquid into vapour?
(a) Condensation
(b) Transpiration
(c) Evaporation
(d) Precipitation.
Answer:
(c) Evaporation

Question 1(iii).
The air that contains moisture to its full capacity:
(a) Relative humidity
(b) Specific humidity
(c) Absolute humidity
(d) Saturated air.
Answer:
(d) Saturated air.

Question 1(iv).
Which one of the following is the highest cloud in the sky?
(a) Cirrus
(b) Stratus
(c) Nimbus
(d) Cumulus.
Answer:
(a) Cirrus

2. Answer the following questions in about 30 words.

Question 2(i).
Name the three types of precipitation.
Answer:
There are many forms of precipitation like dew, fog, rainfall, snowfall, hailstones etc.

- Rainfall: The precipitation in the form of water is called rainfall.
- Snowfall: When the temperature is lower than the 0°C, precipitation takes place in the form of fine flakes of snow and is called snowfall.
- Hailstones: Sometimes, drops of rain after being released by the clouds become solidified into small rounded solid pieces of ice and which reach the surface of the earth are called hailstones.

Question 2(ii).
Explain relative humidity.
Answer:
The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as the relative humidity. It is highest over oceans and lowest over continents. With the change of air temperature, the capacity to retain moisture increases or decreases and the relative humidity is also affected.

Question 2(iii).
Why does the amount of water vapour decreases rapidly with altitude?
Answer:
The quantity of water vapour existing in the air depends upon the rate of evaporation and the temperature of the air which determines its holding capacity of water vapour. Both temperature and evaporation decreases with altitude and as a result water vapour also decreases rapidly with altitude.

Question 2(iv).
How are clouds formed? Classify them.
Answer:
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. 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 :

- cirrus
- cumulus
- stratus
- nimbus.

3. Answer the following questions in about 150 words.

Question 3(i).
Discuss the salient features of the world distribution of precipitation.
Answer:
Salient features of the world distribution of precipitation are given below:

1. Different places on the earth's surface receive different amounts of rainfall in a year and that too in different seasons. In general, as we proceed from the equator towards the poles, rainfall
goes on decreasing steadily. The coastal areas of the world receive greater amounts of rainfall than the interior of the continents. The rainfall is more over the oceans than on the landmasses of the world.

2. Between the latitudes 35° and 40° N and S of the equator, the rain is heavier on the eastern coasts and goes on decreasing towards the west. But, between 45° and 65° N and S of equator, the rainfall is first received on the western margins of the continents and it goes on decreasing towards the east.

3. In some regions rainfall is distributed evenly throughout the year such as in the equatorial belt and in the western parts of cool temperate regions. .

4. On the basis of the total amount of annual precipitation, major precipitation regimes of the world are identified as follows.

- The equatorial belt, the windward slopes of the mountains along the western coasts in the cool temperate zone and the coastal areas of the monsoon land receive heavy rainfall of over 200 cm per annum.
- Interior continental areas receive moderate rainfall varying from 100-200 cm per annum.
- The coastal areas of the continents receive moderate amount of rainfall.
- The central parts of the tropical land and the eastern and interior parts of the temperate lands receive rainfall varying between 50-100 cm per annum.
- Areas lying in the rain shadow zone of the interior of the continents and high latitudes receive very low rainfall-less than 50 cm per annum.

Question 3(ii).
What are forms of condensation? Describe the process of dew and frost formation.
Answer:
Condensation: The transformation of water vapour into water is called condensation. Condensation is caused by the loss of heat. When the water vapour or the moisture in the atmosphere takes one of the following forms — dew, frost, fog and clouds. Forms of condensation can be classified on the basis of temperature and location. Condensation takes place when the dew point is lower than the freezing point as well as higher than the freezing point.

- Dew: When the moisture is deposited in the form of water droplets on cooler surfaces of solid objects (rather than nuclei in air above the surface) such as stones, grass blades and plant leaves, it is known as dew.

- Frost: Frost forms on cold surfaces when condensation takes place below freezing point (CPC), i.e. the dew point is at or below the freezing point.
- Fog and Mist: When the temperature of an air mass containing a large quantity of water vapour falls all of a sudden, condensation takes place within itself on fine dust particles. So, the fog is a cloud with its base at or very near to the ground.
- Smog: Such a condition when fog is mixed with smoke, is described as smog.
- Clouds: 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. As the clouds are formed at some height over the surface of the earth, they take various shapes.

Class 11 Geography Chapter 11 NCERT Extra Questions

Class 11 Geography Chapter 11 Multiple Choice Questions

Question 1.
What do we say to the amount of water vapours present in atmosphere?
(a) Saturation
(b) Humidity
(c) Dew Points
(d) Dew.
Answer:
(b) Humidity

Question 2.
The temperature at which saturation occurs in a given sample of air is known as what?
(a) Saturation
(b) Humidity
(c) Dew Point
(d) Dew.
Answer:
(c) Dew point

Question 3.
Conversion of water vapours into water is called:
(a) Fog
(b) Condensation
(c) Dew
(d) Humidity.
Answer:
(b) Condensation

Question 4.
What do we call to a situation where fog with smoke is found?
(a) Fog
(b) Smog
(c) Dew

(d) Humidity.
Answer:
(b) Smog

Question 5.
What is the absolute amount of water vapours present in atmosphere called?
(a) Absolute humidity
(b) Relative humidity
(c) Condensation
(d) Fog.
Answer:
(a) Absolute humidity

Question 6.
At what height are cirrus clouds formed?
(a) 8000-12000 metres
(b) 3000-5000 metres
(c) 6000-9000 metres
(d) 4000-7000 metres.
Answer:
(a) 8000-12000 metres

Question 7.
At what height are cumulus clouds formed?
(a) 8000-12000 metres
(б) 3000-5000 metres
(c) 6000-9000 metres
(d) 4000-7000 metres.
Answer:
(d) 4000-7000 metres

Question 8.
When the saturated air mass comes across a mountain, it is forced to ascend and as it rises, it expands; the temperature falls, and the moisture is condensed. It is also known as what?
(a) Relief rain
(b) Cyclonic rain
(c) Hailstones
(d) Rainfall.
Answer:
(a) Relief rain

Question 9.
In atmosphere density of water vapour varies. To what per cent does it vary?
(a) 0 – 4%
(b) 5-10%
(c) 7-12%

(d) 9-15%.
Answer:
(a) 0-4%

Question 10.
The temperature at which the water starts evaporating is referred to as:
(a) Dew point
(b) The latent heat of vapourisation
(c) High temperature
(d) Condensation.
Answer:
(b) The latent heat of vapourisation

Question 11.
Interior continental areas receive:
(a) Heavy rainfall
(b) Moderate rainfall
(c) Low rainfall
(d) Cyclonic rainfall.
Answer:
(b) Moderate rainfall.

Class 11 Geography Chapter 11 Very Short Answer Type Questions

Question 1.
What is smog?
Answer:
Such a condition when fog is mixed with smoke, is described as smog.

Question 2.
How is humidity received in atmosphere?
Answer:
The moisture in the atmosphere is derived from water bodies through evaporation and from plants through transpiration.

Question 3.
What is relative humidity?
Answer:
The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as the relative humidity.

Question 4.
What is absolute humidity?
Answer:
The actual amount of the water vapour present in the atmosphere is known as the absolute humidity. It is the weight of water vapour per unit volume of air and is expressed in terms of grams per cubic metre.

Question 5.
By what processes there a continuous exchange of water between the atmosphere, the oceans and the continents?
Answer:
There is a continuous exchange of water between the atmosphere, the oceans and the continents through the processes of evaporation, transpiration, condensation and precipitation.

Question 6.
How are clouds classified?
Answer:
According to their height, expanse, density and transparency or opaqueness clouds are grouped under four types :

1. cirrus;
2. cumulus;
3. stratus;
4. nimbus.

A combination of these four basic types can give rise to the following types of clouds: high clouds cirrus, cirrostratus, cirrocumulus; middle clouds—altostratus and altocumulus; low clouds—stratocumulus and nimbostratus and clouds with extensive vertical development cumulus and cumulonimbus.

Question 7.
When does condensation take place?
Answer:
The transformation of water vapour into water is called condensation. Condensation is caused by the loss of heat.

Question 8.
What are the suitable conditions for making of dew?
Answer:
The ideal conditions for its formation are clear sky, calm air, high relative humidity, and cold and long nights. For the formation of dew, it is necessary that the dew point is above the freezing point.

Question 9.
What are hailstones?
Answer:
Sometimes, drops of rain after being released by the clouds become solidified into small rounded solid pieces of ice and which reach the surface of the earth are called hailstones.

Question 10.
What is rain shadow area?
Answer:

The area situated on the leeward side, which gets less rainfall is known as the rain-shadow area.

Question 11.
What is precipitation?
Answer:
After the condensation of water vapour, the release of moisture is known as precipitation. This may take place in liquid or solid form.

Question 12.
What is convectional rain?
Answer:
Convectional Rain: The air on being heated, becomes light and rises up in convection currents. As it rises, it expands and loses heat and consequently, condensation takes place and cumulous clouds are formed. With thunder and lightening, heavy rainfall takes place but this does not last for long.

Question 13.
What factors influence the process of condensation?
Answer:
Condensation is influenced by the volume of air, temperature, pressure and humidity. Condensation takes place:

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

Class 11 Geography Chapter 11 Short Answer Type Questions

Question 1.
Name and define three important types of rainfall.
Answer:
On the basis of origin, rainfall may be classified into three main types:

1. The convectional rain
2. Orographic or relief rain and
3. Cyclonic or frontal rainfall

1. Convectional rain: The air on being heated, becomes light and rises up in convection currents. As it rises, it expands and loses heat and consequently, condensation takes place and cumulous clouds are formed. With thunder and lightening, heavy rainfall takes place but this does not last for long.
Such rain is common in the summer or in the hotter part of the day. It is very common in the equatorial regions and interior parts of the continents, particularly in the northern hemisphere.

2. Orographic rain: When the saturated air mass comes across a mountain, it is forced to ascend and as it rises, it expands; the temperature falls, and the moisture is condensed. In this sort of rain 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. It is also known as the relief rain.

3. Cyclonic rainfall: These rains take place in low pressure areas where air moves from low pressure area to high pressure are a and this movement brings rainfall.

Question 2.
Explain the process of evaporation.
Answer:
Evaporation is a process by which water is transformed from liquid to gaseous state. Heat is the main cause for evaporation. The temperature at which the water starts evaporating is referred to as the latent heat of vapourisation. Increase in temperature increases water absorption and retention capacity of the given parcel of air. Similarly, if the moisture content is low, air has a potentiality of absorbing and retaining moisture. Movement of air replaces the saturated layer with the unsaturated layer. Hence, the greater the movement of air, the greater is the evaporation.

Question 3.
Explain cyclonic rain.
Answer:
Air expands when heated and gets compressed when cooled. This results in variations in the atmospheric pressure. The result is that it causes the movement of air from high pressure to low pressure, setting the air in motion. Air in horizontal motion is wind. Atmospheric pressure also determines when the air will rise or sink. The wind redistributes the heat and moisture across the planet, thereby, maintaining a constant temperature for the planet as a whole. The vertical rising of moist air cools it down to form the clouds and bring precipitation. It is called cyclonic rain.

Question 4.
Differentiate between
Answer:
(i) Precipitation and Condensation.

Basis	Precipitation	Condensation
Meaning	After the condensation of water vapour, the release of moisture is known as precipitation. This may take place in liquid or solid form.	The transformation of water vapour into water is called condensation. Condensation is caused by the loss of heat.
Sequence	Precipitation takes place after condensation.	Condensation takes place before precipitation.

Forms	It may take form of rainfall, snowfall, hailstorms, sleet etc.	It may take form of dew, smog, clouds, fog and mist etc.

(ii) Absolute humidity and Relative humidity.

Basis	Absolute Humidity	Relative Humidity
Meaning	The actual amount of the water vapour present in the atmosphere is known as the absolute 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.
Unit	It is the weight of water vapour per unit volume of air and is expressed in terms of grams per cubic metre.	It is measured in percentage and hence is unit free.

(iii) Convection rain and Relief rain.

Basis	Convection Rain	Relief Rain
Meaning	The, air on being heated, becomes light and rises up in convection currents. As it rises, it expands and loses heat and consequently, condensation takes place and cumulous clouds are formed. With thunder and lightening, heavy rainfall takes place but this does not last for long.	When the saturated air mass comes across a mountain, it is forced to ascend and as it rises, it expands; the temperature falls, and the moisture is condensed. In 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.
Timing	Such rain is common in the summer or in the hotter part of the day.	Such rain is common in winters.
Prevalent	It is very common in the equatorial regions and interior parts of the continents, particularly in the northern hemisphere.	It is very common in terrestrial regions.

(iv) Fog and Mist.

Basis	Fog	Mist
Meaning	Fogs are drier than mist.	The mist contains more moisture than the fog.

Prevalent	They are prevalent where warm currents of air come in contact with cold currents.	Mists are frequent over mountains as the warm air rising up the slopes meets a cold surface.
Structure	In mist each nuclei contains a thicker layer of moisture.	Fogs are mini clouds in which condensation takes place around nuclei provided by the dust, smoke, and the salt particles.

Class 11 Geography Chapter 11 Long Answer Type Questions

Question 1.
Explain about condensation in detail.
Answer:
1. Meaning: The transformation of water vapour into water is called condensation. Cause: Condensation is caused by the loss of heat.

2. Sublimation: When moist air is cooled, it may reach a level when its capacity to hold water vapour ceases. Then, the excess water vapour condenses into liquid form. If it directly condenses into solid form, it is known as sublimation.

3. Process: In free air, condensation results from cooling around very small particles termed as hygroscopic condensation nuclei. Particles of dust, smoke and salt from the ocean are particularly good nuclei because they absorb water. Condensation also takes place when the moist air comes in contact with some colder object and it may also take place when the temperature is close to the dew point. Condensation, therefore, depends upon the amount of cooling and the relative humidity of the air.

Factors affecting condensation:

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

However, the most favourable condition for condensation is the decrease in air temperature. After condensation the water vapour or the moisture in the atmosphere takes form of dew, frost, fog and clouds.

Question 2.
Explain about fog and mist.
Answer:
When the temperature of an air mass containing a large quantity of water vapour falls all of a sudden, condensation takes place within itself on fine dust particles. So, the fog is a cloud with its base at or very near to the ground.

- Because of the fog and mist, the visibility becomes poor to zero. In urban and industrial centres smoke provides plenty of nuclei which help in the formation of fog and mist.

- Such a condition when fog is mixed with smoke, is described as smog.
- The only difference between the mist and fog is that mist contains more moisture than the fog.
- In mist each nuceli contains a thicker layer of moisture. Mists are frequent over mountains as the warm air rises up the slopes and meets a cold surface.
- Fogs are drier than mist and they are prevalent where warm currents of air come in contact with cold currents. Fogs are mini clouds in which condensation takes place around nuclei provided by the dust, smoke, and the salt particles.

Class 11 Geography Chapter 11 HOTS Questions

Question 1.
On the basis of rainfall received, in how many groups can we classify the world?
Answer:
On the basis of rainfall received, we can classify the world into five groups.

1. The equatorial belt, the windward slopes of the mountains along the western coasts in the cool temperate zone and the coastal areas of the monsoon land receive heavy rainfall of over 200 cm per annum.
2. Interior continental areas receive moderate rainfall varying from 100 – 200 cm per annum.
3. The coastal areas of the continents receive moderate amount of rainfall.
4. The central parts of the tropical land and the eastern and interior parts of the temperate lands receive rainfall varying between 50-100 cm per annum.
5. Areas lying in the rain shadow zone of the interior of the continents and high latitudes receive very low rainfall-less than 50 cm per annum.

Question 2.
Use a diagram to explain the process of evaporation.
Answer:
Evaporation is a process by which water is transformed from liquid to gaseous state. Heat is the main cause for evaporation. Movement of air replaces the saturated layer with the unsaturated layer. Hence, the greater the movement of air, the greater is the evaporation.

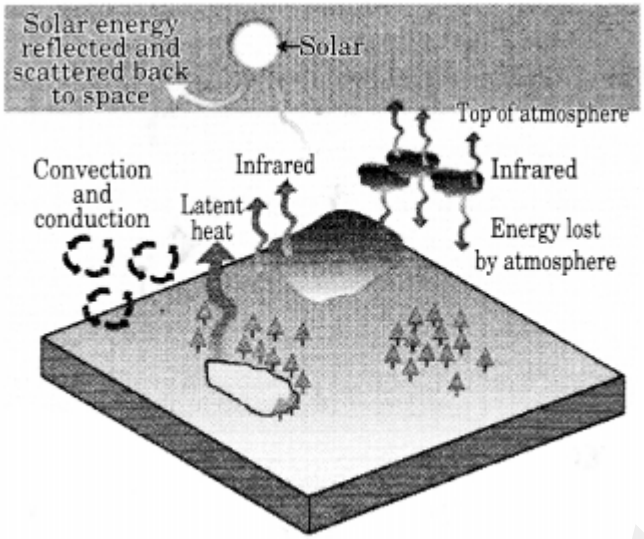

Fig: Water Cycle