14. Humidity

EXERCISE

A. Answer the following questions :

1. What is Evaporation? Name the factors that affect evaporation.

Ans. Evaporation is the process by which a liquid is transformed into gas or vapour. Factors affecting rate of evaporation are:

- Amount of water available.
- Temperature.
- Relative humidity.

- Area of evaporating surface.
- Air pressure.

2. What is Condensation? When does condensation occur?

Ans. Condensation is the process of water vapour changing to liquid state. If the air is cooled below its dew point, some of the water vapour becomes liquid.

- Thus, any further cooling of the saturated air starts the process of condensation.
- Whenever the dew point temperature falls below the freezing point (0 ◦), water vapour may directly convert into ice by the process of sublimation. It may be termed as crystallisation.
- Condensation may start with the addition of any further water vapour to the saturated air or with the reduction of its temperature.

3. How does air gets cooled?

Ans. The only process bringing about cloudy condensation and resultant precipitation from extension of air masses is the adiabatic cooling.

4. Name the different forms of condensation.

Ans. The different forms of condensation are:

- Hail, Snow, Dew. Frost, Fog, Mist, Smog & Rain.

5. What is Precipitation?

Ans. Precipitation is defined as water in liquid or solid forms falling to the Earth. It can be termed as deposition of atmospheric moisture and is the most important phase of the Hydrologic Cycle.

6. State the conditions necessary for precipitation.

Ans. The conditions necessary for precipitation are:

- The air must be saturated.
- The temperature, at which condensation takes place, must be present.
- The air must contain small particles of matter such as dust around which droplets form.
- The air must be cooled below its dew point.

7. What are the different forms of precipitation?

Ans. Same as 4.

8. How is the convectional rainfall caused?

Ans. Convectional rainfall is caused by the process of convection. The two factors necessary to cause this type of precipitation are intense heating of the surface and abundant supply of moisture.

- Due to intense heating of the surface, the surface air gets heated and expands and rises up conventionally holding moisture. It is thereby cooled adiabatically and its temperature falls below the dew point, thereby forming clouds.
- The resultant clouds are of Cumulonimbus type which gives heavy rains.
- This type of rains mostly occur in the Equatorial Zone which experiences direct rays of the sun almost throughtout the year.

9. Give two characteristic features of the convectional rainfall. Name an area which commonly experiences this type of rainfall.

Ans. The two characteristics features of convectional rainfall are:

- This type of rain mostly occurs at 4 o'clock in the afternoon.
- It is always torrential accompanied by lightning and thunder.
- This type of rains mostly occurs in the equatorial Zone which experiences direct rays of the sun almost throughout the year.

10. What are the chief requirements for orographic rainfall to be experienced? Name a region which experiences it.

Ans.

- When moisture laden winds are unable to cross the mountains they are forced to rise along it. They get cooled adiabatically and if sufficient water vapour is present, rain occurs on the windward side. This type is called Orographic rainfall.
- The region which experiences it is the wind ward side of Western Ghats in India.

11. What is the meaning of Rain Shadow? Give an example.

Ans. The area on the leeward slopes of the mountain range, in the shadow of the mountains, where precipitation is greatly reduced compared to windward slope. This is called Rain Shadow area. For example, in India, Western Ghats in the windward side get maximum moisture from south-west monsoons whereas in the leeward side there is a rain shadow area receiving very little rain.

12. What is Cyclonic Rainfall? Name a region which experiences this type of rainfall.

Ans. Cyclonic rain occurs when a mass of the warm air (Warm Front) meets the mass of cold air (Cold Front). The warm air is forced up above the cooler air as it is lighter. Condensation takes place

and clouds are formed, followed by rains.

Cyclonic rain is common throughout the Doldrums. Winter rainfall in Northwest India is a tropical example of cyclonic rainfall.

13. State the principal factors affecting the distribution of rainfall. Which are the wettest regions of the world?

Ans. The principal factors affecting the distribution of rainfall are:

- Latitude.
- Continents and Oceans.
- Mountain Barriers.

The latitudinal belt of maximum precipitation is found in the Equatorial Zone between 8◦ N to 8◦ S along with the seasonal shifting of the Doldrums

14. Give two examples of the areas that receive less than 25 cm of rainfall.

Ans. The two examples of the areas that receive less than 25 cm of rainfall in India are:

- Northern part of Kashmir, Western Rajasthan.

15. Explain the process of precipitation in brief.

Ans. The only process bringing about cloudy condensation and resultant precipitation from extension air masses is the adiabatic cooling. But at the same time condensation is not followed by precipitation all the time. Only when the cold droplets, ice pellets or ice crystals grow to such a large size as to overcome the normal buoyancy, precipitation does occur.

16. Name the three types of rainfall.

Ans. The three types of rainfall are:

- Convectional.
- Orographic.
- Cyclonic.

17. Mention two characteristics of Orographic rainfall.

Ans. The two characteristics of Orographic rainfall are:

- When the moisture laden wind rises along the wind rises along the windward slope of the mountain the pressure on it decreases, the air expands and cools.
- On the leeward side, as the dry air descends the mountain slopes, the pressure decreases.

18. Name the factors necessary for convectional rainfall.

Ans. The factors necessary for convectional rainfall are:

- Intense heating of the surface.
- Abundant supply of moisture.

19. Where does cyclonic rainfall occur?

Ans. The Cyclonic rainfall occurs in Northwest India in winter.

B. Explain the following terms :

1. Absolute Humidity.

Ans. Absolute Humidity – Absolute humidity is the actual amount of water vapour present in a given volume of air, regardless of temperature.

2. Relative Humidity

Ans. Relative humidity can be defined as "a ratio between the actual amount of water vapour present in the air and the maximum amount of water the air can hold at the temperature." It is always expressed as a percentage.

3. Dew Point

Ans. **Dew point :** The temperature at which the air becomes fully saturated with water vapour is known as dew point.

4. Clouds

Ans. Clouds have been defined as a visible aggregation of minute water droplets/ ice particles in the air above ground level.

5. Hail

Ans. Form of precipitation consisting of pellets or spheres of ice with a concentric layered structure.

6. Fog

Ans. Fog is also formed when warm and moist air moves along the surface of colder region and its temperature goes down to dew point.

7. Snow

Ans. Snow consists of crystals or grains of ice which grow directly from the water vapour of the air. Snow displays beautiful forms of symmetrical patterns that are formed in winter when the temperature is below freezing point.

8. Precipitation

Ans. Precipitation is defined as *water in liquid or solid forms falling to the Earth*. It can be termed as deposition of atmospheric moisture and is the most important phase of the hydrological cycle.

Atmospheric moisture may be precipitated either in solid

or liquid states. Hail, snow, sleet, rain and drizzle are the common forms of precipitation.

C. Distinguish between the following pairs :

1. Evaporation and Condensation

Evaporation	**Condensation**
Evaporation is the process of conversion of a substance from liquid to gaseous state at any temperature less than boiling point.	Condensation is the process of conversion of a substance from gaseous to liquid state at a constant temperature.
Evaporation doesn't occur at a constant temperature.	The constant temperature at which condensation occurs is called liquefaction point.

2. Convectional Rainfall and Orographic Rainfall

Convectional Rainfall	**Orographic Rainfall**
Rainfall is caused by vertical ascent of heated air.	Relief rainfall is caused when the mountain forces the air to rise along the up slopes of the mountain.
It is in the form of heavy downpour and is accompanied with thunder and lightning. It is for a short time.	It takes place on the windward side of the mountain and the leeward side gets very less rain and is known as the rain shadow area.
It takes place in the equatorial region daily and in the interiors of the continents in summer.	It takes place in the mountainous region, e.g., Western Ghats. High pressure belt to the sub polar low pressure belt.

3. Dew and Frost

Dew	**Frost**
Dew are the tiny drops of water that form on cool surfaces at night.	Frost is formed by freezing of water vapours that is deposited in saturated air

It basically forms dew, when it freezes because the air temperature falls below the level necessary for freezing.	Frost is observed as ice crystals mostly on grass.

D. Give reasons for the following :

1. Convectional currents generally lead to rain.

Ans. Due to intense heating of the surface, the surface air gets heated and expands and rises up conventionally holding moisture. It is thereby cooled adiabatically and its temperature falls below the dew point, thereby forming clouds.

- The resultant clouds are of Cumulonimbus type which gives heavy rains.
- This type of rains mostly occurs in the Equatorial Zone which experiences direct rays of the sun almost throughout the year.

2. The rainshadow areas are generally dry.

Ans. The amount of precipitation decreases as the maximum precipitation occurs on windward side. Thus, on the leeward side, slopes of these mountain ranges, there always exists a relatively dry area called rainshadow.

3. Cyclonic rainfall is common in the belt of Westerlies.

Ans. Cyclonic rainfall is common in the belt of Westerlies:

- The cyclonic rain is most common in the belt of Westerlies especially during the winter.
- It is caused by a warm oceanic air mass passing over a cold land in winter. Due to contact, it cools and condensation takes place.

4. Areas of trade winds are usually dry.

Ans. Areas of trade winds are usually dry.

- Trade wind are usually dry because it blow from dry region to wet region or blow from higher pressure belt to lower pressure belt.

5. Cyclonic rainfall is also known as frontal rainfall.

Ans. Cyclonic rainfall happens when a mass of warm air meets the mass of cold air along the front. That is why it is called cyclonic rainfall.

6. Convectional rainfall is also called 4 o'clock shower.

Ans. The torrential convectional rainfall occurs almost daily in the afternoon with thunder and lightning. That is why it is called 4 o'clock shower.

E. Diagrams :

Draw a self-explanatory diagram to show all the three types of rainfall.

Ans. Students to do it themselves.

F. Choose the correct option.

1. Which of the following statement related to Relative humidity is not correct?

(a) It is a ratio between the actual amount of water vapour present in the air & the maximum amount of water the air can hold at that temperature.

(b) Saturated air has 100 percent of relative humidity.

(c) Relative humidity increases with more water vapour in the atmosphere.

(d) Relative humidity is measured in degrees.

2. The process through which the water changes from its liquid state into water vapour is called

(a) Evaporation (b) Condensation

(c) Precipitation (d) Conduction

3. Which of the following factors control the condensation?

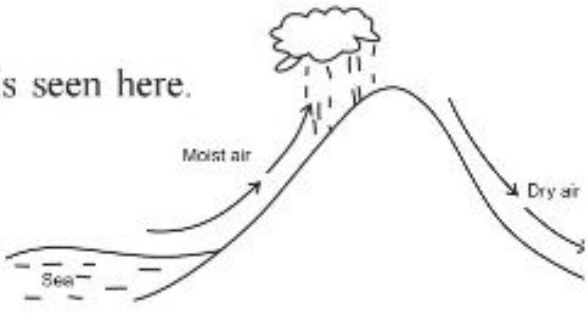
(a) The air temperature must fall below the dew point temperature

(b) The relative humidity must be high

(c) High rate of cooling

(d) All the above

4. Identify the type of rainfall is seen here.



(a) Convectional type

(b) Orographic type

(c) Frontal type

(d) Cyclonic type

5. Which of the following region receives convectional type of rainfall?

(a) Temperate zone (b) Equatorial zone

(c) Tropical zone (d) Polar areas

6. Which of the following region receives cyclonic type of rainfall?
   (a) Temperate zone (b) Mid-latitudinal region
   (c) Tropical zone (d) All of these
7. The principal factors controlling the distribution of precipitation are
   (a) Latitude (b) Continents & ocean
   (c) Mountain Barriers (d) All of these
8. Which of the following is not a form of condensation?
   (a) Fog (b) Dew
   (c) Rain (d) Frost
9. The temperature at which air gets saturated is called
   (a) Melting point (b) Dew point
   (c) Freezing point (d) Boiling point
10. Which of the following is the component of hydrological cycle?
   (a) Evaporation (b) Condensation
   (c) Precipitation (d) All of these
11. Fog, dew, mist are mainly formed in
   (a) Summer season (b) Winter season
   (b) Spring season (d) Rainy
12. Which of the following is a low cloud?
   (a) Cirrus (b) Cirrostratus
   (c) Stratus (d) All of these

Answers

1. d 2. a 3. d 4. b 5. b 6. d 7. d 8. c
9. b 10. d 11. b 12. c

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