11. Water in the Atmosphere

1. Multiple-choice questions

(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

(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

(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

(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

(i) Name the three types of precipitation.

Answer: Three types of precipitation are:

(i) rainfall,

(ii) snowfall and

(iii) sleet.

(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 normally expressed as a percentage. A higher percentage means that the air-water mixture is more humid.

(iii) Why does the amount of water vapour decreases rapidly with altitude?

Answer: The water vapour in the atmosphere is derived from water bodies through evaporation and from plants through transpiration. The amount of water vapour in the atmosphere depends upon the rate of evaporation and the temperature of the air, which determines its water vapour holding capacity. Both evaporation and temperature decrease with increasing altitude in the troposphere. Therefore, water vapour also decreases rapidly with altitude in the lower layer of atmospheres.

(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. According to their height, expanse, density and transparency or opaqueness clouds are grouped under four types:

(i) cirrus;

(ii) cumulus;

(iii) stratus;

(iv) nimbus.

3. Answer the following questions in about 150 words

(i) Discuss the salient features of the world distribution of precipitation.

Answer: Rainfall is the main form of precipitation. Based on the total amount of annual precipitation, major precipitation regimes of the world are identified as follows:

Heavy Rainfall: Areas receiving over 200 cm of annual rainfall are termed as areas of heavy rainfall. These areas include the equatorial belt in Africa, Asia, and South America, the windward slopes of the mountains along the western coasts in the cool temperate zone and the coastal areas of the monsoon lands.

Moderate Rainfall: This includes areas having 100 to 200 cm of annual rainfall. The interior of continents and the coastal areas of the continents receive moderate rainfall.

Inadequate Rainfall: The central parts of the tropical lands and eastern and interior parts of temperate lands receive inadequate rainfall, i.e., between 50 and 100 cm of annual rainfall.

Low Rainfall: Areas receiving less than 50 cm of annual rainfall are known as areas of low rainfall. The rain shadow areas in the interior of the continents and high latitudes receive very low rainfall.

(ii) What are forms of condensation? Describe the process of dew and frost formation.

Answer: The process of change of state from gaseous to liquid or solid is known as condensation. Dew, frost, fog and mist, clouds, precipitation, etc., are different-forms of condensation.

Dew: The form of droplets that appears on thin, exposed objects in the morning or evening due to condensation, is called Dew. Earth's surface is heated during daytime and it cools down at night. When surface temperature drops, eventually reaching the dew point, atmospheric water vapor condenses to form small droplets on the surface.

Frost: Frost forms on cold surfaces when condensation takes place below freezing point (0°C), i.e., the dew point is at or below the freezing point. Frost is formed when the temperature of the air falls rapidly so that the water vapour present in the air is directly turned into solid particles without turning into liquid state.