CH-10 – WATER IN THE ATMOSPHERE

Key Information

- The temperature at which the water starts evaporating is referred to as the latent heat of vaporisation. During evaporation the latent heat is absorbed.
- Evaporation increases when either the temperature is high or air is unsaturated / air is moving.
- Condensation: Water vapour changes to liquid, latent heat is released back in air.
- If water vapour directly changes into solid ice, it is known as sublimation.
- 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.
- The percentage of moisture present in the atmosphere as compared to its full capacity at a given temperature is known as the relative humidity.
- The air containing moisture to its full capacity at a given temperature is said to be saturated air. It means that the air at the given temperature is incapable of holding any additional amount of moisture at that stage.
- The temperature at which saturation occurs in a given sample of air is known as dew point.
- Cooling the air below the dew point causes condensation.
- A condition when fog is mixed with smoke, is described as smog.
- Two types of hygrometers are used to measure humidity – Psychrometer and Hair hygrometer.
- Rain Gauges are used to measure rainfall.

FORMS OF CONDENSATION

Q.1 Describe the four forms of water vapour formed after condensation?
Ans.

- **Dew** – When moisture condense as water droplets on cooler surfaces of solid objects it is known as dew. The ideal conditions are clear sky, calm air, high relative humidity, and cold and long nights. Dew point is above the freezing point.
- **Frost** – When moisture condense as ice crystals on cooler objects it is called Frost. The ideal conditions are the same as those for the formation of dew, but the temperature must be at 0^0 C. The dew point is at or below the freezing point.
- **Fog and Mist** – When condensation take place in the air near to the ground is called fog/mist. They are mini clouds near the ground. The only difference between the mist and fog is that mist contains more moisture than the fog.
- **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.

TYPES OF CLOUDS

Q.2 Classify types of clouds according to their height, density and transparency or opaqueness.
Ans : (i) cirrus; (ii) cumulus; (iii) stratus; (iv) nimbus.

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

- **Cumulus** – Cumulus clouds look like cotton wool. They are generally formed at a height of 4,000 - 7,000 m. They exist in patches and can be seen scattered here and there. They have a flat base.
- **Stratus** – As their name implies, these are layered clouds covering large portions of the sky. These clouds are generally formed either due to loss of heat or the mixing of air masses with different temperatures.
- **Nimbus** – Nimbus clouds are black or dark grey. They form at middle levels or very near to the surface of the earth. These are extremely dense and opaque to the rays of the sun. Sometimes, the clouds are so low that they seem to touch the ground. Nimbus clouds are shapeless masses of thick vapour.

TYPES OF PRECIPITATION

Q.3 Explain four types of precipitation.

- **Rainfall** – The precipitation in the form of water is called *rainfall*. On the basis of origin, rainfall may be classified into three main types –
  - *The convectional rainfall,*
  - *The orographic or relief rainfall*
  - *The cyclonic or frontal rainfall.*
- **Snowfall** – When the temperature is lower than the 0^0C, precipitation takes place in the form of fine flakes of snow and is called *snowfall.* Moisture is released in the form of hexagonal crystals. These crystals form flakes of snow.
- **Sleet** – Sleet is frozen raindrops. When a layer of warm air overlies a subfreezing air near the ground, precipitation is in the form of sleet. Raindrops, which leave the warmer air, encounter the colder air below. As a result, they freeze and small pellets of ice fall.
- **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. These are formed by the rainwater passing through the colder layers. Hailstones have several concentric layers of ice one over the other.

World Distribution of Rainfall

Q.4 Describe the distribution of rainfall in the world.
Ans:

- As we proceed from the equator towards the poles or from coastal areas towards interior, rainfall goes on decreasing steadily.
- Between the latitudes 35^0 and 40^0 N and S of the equator, the rain is heavier on the eastern coasts and goes on decreasing towards the west. But, between 45^0 and 65^0 N and S of equator, the rain is heavier on the western coasts and goes on decreasing towards the east.
- Wherever mountains run parallel to the coast, the rain is greater on the coastal plain, on the windward side and it decreases towards the leeward side.