



CHAPTER-3

AIR

NOTES:

Composition of the atmosphere

The atmosphere is composed of several gases, water vapour and dust particles.

Nitrogen is the most plentiful gas and occupies 78% of the total volume. Nitrogen is vital for plant life. Oxygen makes up about 21% of the air by volume. Human beings and animals need oxygen to breathe. Green plants produce oxygen. Remaining 1% is made up of gases like carbon dioxide, argon, helium, methane, hydrogen and ozone.

Dust particle such as smoke, fine dust, salt particles and ash are also present in the atmosphere. Water vapour is another component in the air and plays an important role in climate.

Based on changes in temperature, the atmosphere is divided into 5 layers.

The troposphere is the lowest layer of the atmosphere. All kinds of weather phenomena occur in this layer due to presence of dust particles and water vapour. This layer extends for about 12km on an average.

The stratosphere lies above the troposphere. It is cold and clean layer. The zone of separation between the troposphere and the stratosphere is called tropopause.

The mesosphere exists above the stratosphere. Ozone is found in upper stratosphere and mesosphere. Ozone layer absorbs ultraviolet rays from the sun, which is dangerous for our life.

The thermosphere is above the mesosphere where the air is very thin. Upper part of mesosphere and large part of thermosphere is called the ionosphere where molecules of gases are ions. Ionosphere reflects the radio waves back to the earth's surface.

The exosphere is the outermost layer of the atmosphere. It has very thin air. Hydrogen and helium gases predominate in this layer.

Elements of weather and climate

The condition of the atmosphere at a particular time and place is called weather. It is assessed in terms of temperature, pressure, humidity, wind, rainfall etc.

Climate is the average weather condition for a given region over a long period.

Atmospheric Temperature

The degree of hotness and coldness of the air is known as temperature. The amount of solar radiation received by the earth is called insolation.

On the basis of heat, the surface of the earth is divided into three heat zones.

1. Torrid zone- It lies between the tropic of cancer and the tropic of Capricorn. The sun's rays are almost vertical throughout the year.
2. Temperate zone- It lies between the tropic of cancer and the Arctic circle in the northern hemisphere and between the tropic of Capricorn and the Antarctic circle in the southern hemisphere. Receives less amount of heat.
3. Frigid zone- It lies to the Arctic circle in the northern hemisphere and to the south of Antarctic Circle in the southern hemisphere. Here sun's rays are very slanting and are the coldest parts of the surface of the earth.

Heating and cooling of the atmosphere

The atmosphere absorbs very little of the solar radiation. From the ground surface, the heat is transferred to atmosphere through the process of radiation, conduction, convection and advection.

Factors controlling temperature

The temperature is measured by an instrument called thermometer. The atmospheric temperature does not remain the same everywhere and varies from place to place. It depends upon a number of factors like latitude, altitude, distances from the sea, prevailing winds, ocean currents and slope of the land. The temperature of air also decreases with height. Fahrenheit and Celsius scale are used to measure temperature.

Atmospheric pressure

The weight of the air is called atmospheric pressure. Air pressure is measured by an instrument called barometer. Normal air pressure at sea level is about 76cm.

Atmospheric pressure decreases with height. The air becomes thinner and thinner, as we go up, and its pressure also goes on decreasing.

The main pressure belts on the earth's surface are Equatorial Low pressure Belt, Sub-Tropical High Pressure Belts, Sub-Polar Low Pressure Belts and Polar High Pressure Belts.

Wind System

Horizontal movement of air is called wind. The winds which blow throughout the year in a particular direction are called permanent or planetary winds e.g., the Trade winds, the Westerlies and the Polar winds. The winds which blow over a particular season are called

Periodic winds. Monsoon is an example. Indian agriculture depends very much on the monsoon. 'Loo' of the upper Ganga plains and 'Ashit Awan' of Manipur are local winds.

Cyclone

A cyclone is an area of low atmospheric pressure in the centre surrounded by high pressure areas on all sides. Cyclones are devastating to low lying coastal areas.

Humidity

The water vapour present in the air is known as humidity. Due to the heat of the sun water evaporates from the water bodies and enters the atmosphere. As the hot air rises, it reaches higher level of the atmosphere where temperature is much lower. Due to decrease in temperature the water vapour starts converting into water droplets and ice crystal. This process is called condensation.

Rainfall is very important for the survival of plants and animals. Rainfall is of three types, viz, convectional rainfall, orographic rainfall and cyclonic rainfall. It is measured with the help of rain gauge.

