Revision Notes
Chapter – 4
Air

- Our atmosphere is surrounded by a huge blanket of air called atmosphere.
- All living beings on this earth depend on the atmosphere for their survival. It provides us the air we breathe and protects us from the harmful effects of the sun's rays.
- Without this blanket of protection, we would be harmed by the heat of the sun during day and get frozen during night.

• **Composition of the Atmosphere**:

(i) Nitrogen (78%) and oxygen (21%) are the two gases which make up the bulk of the atmosphere.
(ii) Carbon dioxide, helium, ozone, argon and hydrogen are found in lesser quantities.
(iii) Apart from these gases, tiny dust particles are also present in air.
(iv) Nitrogen is the most plentiful gas in the air. When we inhale, we take some amount of nitrogen into our lungs and exhale it. But plants need nitrogen for their survival. Bacteria, that live in the soil and roots of some plants, take nitrogen from the air and change its form so that plants can use it.
(v) Oxygen is the second most plentiful gas in the air. Humans and animals take oxygen from the air as they breathe. Green plants produce oxygen during photosynthesis. Hence, the oxygen content in the air remains constant. If we cut trees, then this balance gets disturbed.
(vi) Carbon dioxide is another important gas. Green plants use carbon dioxide to make their food and release oxygen. Humans or animals release carbon dioxide. The amount of carbon dioxide released by humans or animals seems to be equal to the amount used by the plants which make a perfect balance.
(vii) The balance is upset by burning of fuels, such as coal and oil. They add billions of tons of carbon dioxide into the atmosphere each year. As a result, the increased volume of carbon dioxide is affecting the earth's weather and climate. Carbon dioxide absorbs heat and heats up the atmosphere.

• **Structure of the Atmosphere:**

(i) Our atmosphere is divided into five layers starting from the earth's surface.
(ii) The first layer is the Troposphere whose average height is 13 km. The air we breathe exists here. Almost all the weather phenomena like rainfall, fog and hailstorm occur in this layer.
(iii) The second layer is the Stratosphere which extends up to 50 km. This layer is almost free from clouds and associated weather phenomenon, making conditions most ideal for flying aeroplanes.
It contains a layer of ozone gas that protects us from the sun's harmful rays.
(iv) The third layer is the Mesosphere which extends up to the height of 80 km. Meteorites burn up in this layer on entering from space.
(v) The fourth layer is the Thermosphere which extends from 80 km to 400 km. In thermosphere, temperature rises very rapidly with increasing height. Ionosphere is a part of this layer. This layer helps in radio transmission. In fact, radio waves transmitted from the earth are reflected back to the earth by this layer.
(vi) The uppermost layer of atmosphere is Exosphere which has very thin air. Light gases like helium and hydrogen float into the space from here.

• **Weather and Climate**:

(i) Weather is the hour-to-hour, day-to-day condition of the atmosphere. Weather can change dramatically from day to day.
(ii) The average weather conditions of a place for a longer period of time represents the climate of a place.

• **Temperature:**

(i) The degree of hotness and coldness of the air is called temperature.
(ii) The temperature of the atmosphere changes not only between day and night but also from season to season.
(iii) An important factor that influences the distribution of temperature is insolation.
(iv) Insolation is the incoming solar energy intercepted by the earth.
(v) The amount of insolation decreases from the equator towards the poles.
(vi) The temperature in cities is much higher than that of villages. The concrete and metals in buildings and the asaphalt of roads get heated up during the day. This heat is released during the night. Also, the crowded high rise buildings of the cities trap the warm

air and thus raise the temperature of the cities.

• Air Pressure:

(i) Air pressure is defined as the pressure exerted by the weight of air on the earth's surface.
(ii) The air above us presses us with a great force on our bodies. However, we don't even feel it. This is because the air presses us from all directions and our body exerts a counter pressure.
(iii) As we go up the layers of atmosphere, the pressure falls rapidly. The air pressure is highest at sea level and decreases with height.
(iv) Horizontally, the distribution of air pressure is influenced by temperature of air at a given place.
(v) In areas where temperature is high the air gets heated and rises. This creates a low-pressure area. Low pressure is associated with cloudy skies and wet weather.
(vi) In areas having lower temperature, the air is cold. It is therefore heavy. Heavy air sinks and creates a high pressure area. High pressure is associated with clear and sunny skies.
(vii) The air always moves from high pressure areas to low-pressure areas.

• Wind:

(i) The movement of air from high-pressure areas to low-pressure areas is called wind.
(ii) Winds can be broadly divided into three types: permanent winds, seasonal winds and local winds.

- **Permanent winds** – The trade winds, westerlies and easterlies are the permanent winds. These blow constantly throughout the year in a particular direction.
- **Seasonal winds** – These winds change their direction in different seasons. For example, monsoons in India.
- **Local winds** – These blow only during a particular period of the day or year in a small area. For example, land and sea breeze.

(iii) On 25 October 1999, cyclonic winds originated as a depression and affected Odisha killing thousands of people. The damages caused were mainly due to three factors: wind velocity, rain and tidal surge.
The winds of upto 260 km per hour lasted for over 36 hours. These high velocity winds uprooted trees and damaged the kutcha houses. Roof tops of several industrial sheds and

other houses were also blown away. Power supply and telecom lines snapped completely. Heavy rain occurred under the influence of the cyclone for three days continuously. These rains led to flooding in the major rivers of Odisha.

• **Moisture:**

(i) When water evaporates from land and another water bodies, it becomes water vapour.
(ii) Moisture in the air at any time is known as humidity. On a humid day, clothes take longer to dry and sweat from our body does not evaporate easily, making us feel very uncomfortable.
(iii) When the water vapour rises, it starts cooling. The water vapour condenses causing the formation of droplets of water. Clouds are just masses of such water droplets.
(iv) When these droplets of water become too heavy to float in air, they come down as precipitation.
(v) Precipitation that comes down to the earth in liquid form is called rain.
(vi) Jet planes flying in the sky leave a white trail behind them. The moisture from their engines condenses. We see trails of this condensed moisture for some time when there is no air movement to disturb it
(vii) On the basis of mechanism, there are three types of rainfall: the convectional rainfall, the orographic rainfall and the cyclonic rainfall.
(viii) Rainfall is very important for the survival of plants and animals. It brings fresh water to the earth's surface. If rainfall is less – water scarcity and drought occur. On the other hand if it rains more, floods take place.