

- Isobars are lines connecting places having equal pressure.
- The weight of a column of air contained in a unit area from the mean sea level to the top of the atmosphere is called the atmospheric pressure.
- When isobars are straight and when there is no friction, the pressure gradient force is balanced by the Coriolis force and the resultant wind blows parallel to the isobar. This wind is known as the geostrophic wind.
- In mountainous regions, during the day the slopes get heated up and air moves upslope from the valley. This wind is known as the valley breeze.
- During the night the slopes get cooled and the dense air descends into the valley as the mountain wind.
- The cool air, of the high plateaus and ice fields draining into the valley is called katabatic wind.
- A thunderstorm is a well-grown cumulonimbus cloud producing thunder and lightning. It is characterised by intense updraft of rising warm air.
- When the clouds extend to heights where sub-zero temperature prevails, hails are formed and they come down as hailstorm.
- If there is insufficient moisture, a thunderstorm can generate dust storms.
- From severe thunderstorms sometimes spiralling wind descends with great force, with very low pressure at the centre, causing massive destruction on its way. Such a phenomenon is called a tornado.
- Tornadoes generally occur in middle latitudes. The tornado over the sea is called water spouts.
- During the day the land heats up faster and becomes warmer than the sea. Thus, pressure gradient from sea to land is created and the wind blows from the sea to the land as the sea breeze.
- In the night the land loses heat faster and is cooler than the sea. The pressure gradient is from the land to the sea and the wind blows from the land to the sea as the land breeze.

Q.1 Why is the pressure measured at station level reduced to the sea level in preparation of weather maps?

Ans In order to eliminate the effect of altitude on pressure, it is measured at any station after being reduced to sea level for purposes of comparison.

Q.2 In the lower atmosphere the pressure decreases rapidly with height. Why we do not experience strong upward winds?

Ans The vertical pressure gradient force is much larger than that of the horizontal pressure gradient. But, it is generally balanced by a nearly equal but opposite gravitational force. Hence, we do not experience strong upward winds.

Q.3 Why tropical cyclones are not formed over the equator?

Ans At the equator, the Coriolis force is zero and the wind blows perpendicular to the isobars. The low pressure gets filled instead of getting intensified. That is the reason why tropical cyclones are not formed near the equator.

Q.4 What are the various names of tropical cyclones in different parts of the world?

Ans They are known as Cyclones in the Indian Ocean, Hurricanes in the Atlantic, Typhoons in the Western Pacific and South China Sea, and Willy-willies in the Western Australia.

Q.5 Discuss the three factors affecting the speed and direction of wind.

Ans

- **Pressure Gradient Force:** The differences in atmospheric pressure produces a force. The rate of change of pressure with respect to distance is the pressure gradient. The strong pressure gradient induces strong winds and weak pressure gradient result in calm air.

-**Frictional Force:** It is greatest at the land surface and over the sea surface the friction is minimal. Thus, winds are faster over sea surface as compared to land surface.

-**Coriolis Force:** The rotation of the earth about its axis affects the direction of the wind. It deflects the wind to the right direction in the northern hemisphere and to the left in the southern hemisphere. The deflection is more when the wind velocity is high. It is maximum at the poles and is absent at the equator.

Q.6 The extra tropical cyclone differs from the tropical cyclone in number of ways. Justify.

Ans The extra tropical cyclone differs from the tropical cyclone in number of ways.

- The extra tropical cyclones have a clear frontal system which is not present in the tropical cyclones.
- Extra tropical cyclones can originate over the land and sea. Whereas the tropical cyclones originate only over the seas and on reaching the land they dissipate.
- The extra tropical cyclone affects a much larger area as compared to the tropical cyclone.
- The wind velocity in a tropical cyclone is much higher and it is more destructive.
- The extra tropical cyclones move from west to east but tropical cyclones, move from east to west.

Q.12 Draw a simplified diagram to show the general circulation of the atmosphere over the globe.

