

NCERT SOLUTIONS

CLASS - 11th



aglasem.com

Class : 11th

Subject : Geography

Chapter : 10

Chapter Name : Atmospheric Circulation and Weather System

Q1 Multiple choice questions.

(i) If the surface air pressure is 1,000 mb, the air pressure at 1 km above the surface will be:

- (a) 700 mb
- (b) 1,100 mb
- (c) 900 mb
- (d) 1,300 mb

(ii) The Inter Tropical Convergence Zone normally occurs:

- (a) near the Equator
- (b) near the Tropic of Cancer
- (c) near the Tropic of Capricorn
- (d) near the Arctic Circle

(iii) The direction of wind around a low pressure in northern hemisphere is:

- (a) clockwise
- (b) perpendicular to isobars
- (c) anti-clock wise

(d) parallel to isobars

(iv) Which one of the following is the source region for the formation of air masses?

(a) the Equatorial forest

(b) the Himalayas

(c) the Siberian Plain

(d) the Deccan Plateau

Answer.(i) (c) 900 mb

(ii) (a) near the Equator

(iii) (c) anti-clock wise

(iv) (c) the Siberian Plain

Page : 93 , Block Name : Exercises

Q2 Answer the following questions in about 30 words.

(i) What is the unit used in measuring pressure? Why is the pressure measured at station level reduced to the sea level in preparation of weather maps?

(ii) While the pressure gradient force is from north to south, i.e. from the subtropical high pressure to the equator in the northern hemisphere, why are the winds north easterlies in the tropics.

(iii) What are the geostrophic winds?

(iv) Explain the land and sea breezes.

Answer.

(i) Millibar or Pascal is the unit for measuring pressure. Most widely used unit is kilo Pascal expressed as hpa.

The pressure measured at station level is reduced to sea level in the preparation of weather maps in order to eliminate the effect of altitude on pressure.

(ii) While the pressure gradient force is from north to south, i.e. from the subtropical high pressure to the equator in the northern hemisphere, the winds north easterlies in the tropics because the coriolis force acts perpendicular on the wind and deflects the wind to the right direction in the northern hemisphere making the direction of the wind north easterly.

(iii) 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.

(iv) The land and sea absorb and transfer heat differently. During the day the land heats up faster and becomes warmer than the sea. Therefore, over the land the air rises giving rise to a low pressure area, whereas the sea is relatively cool and the pressure over sea is relatively high. 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 reversal of conduction takes place. The land loses heat faster and is cooler than the sea. The pressure gradient is from the land to the sea and hence land breeze results.

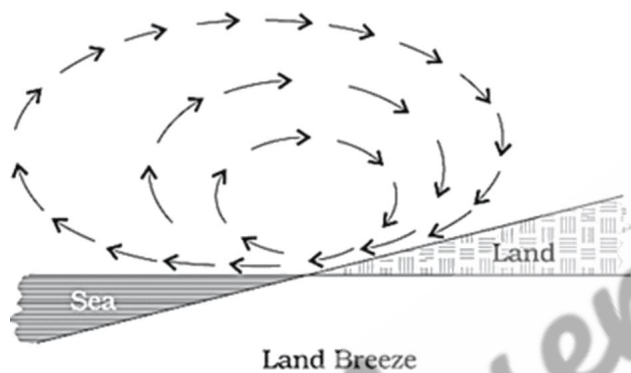
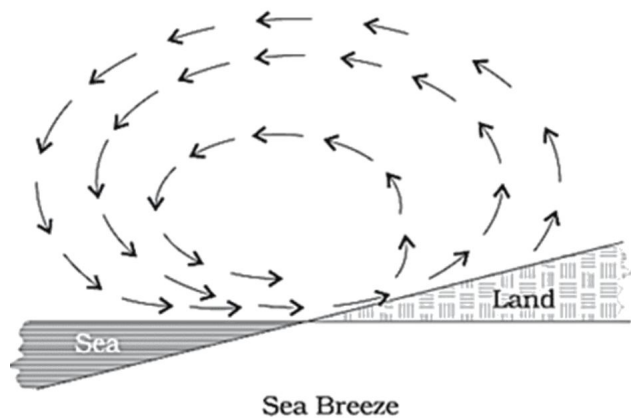


Fig. Sea Breeze and Land Breeze

Page : 93 , Block Name : Exercises

Q3 Answer the following questions in about 150 words.

- (i) Discuss the factors affecting the speed and direction of wind.
- (ii) Draw a simplified diagram to show the general circulation of the atmosphere over the globe. What are the possible reasons for the formation of subtropical high pressure over 30° N and S latitudes?

(iii) Why does tropical cyclone originate over the seas? In which part of the tropical cyclone do torrential rains and high velocity winds blow and why?

Answer.

(i) The air in motion is called wind. The wind blows from high pressure to low pressure. The wind at the surface experiences friction. The rotation of the earth also affects the wind movement. Thus, the horizontal winds near the earth's surface respond to the combined effect of three forces :—

→ 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 pressure gradient is strong where the isobars are close to each other and is weak where the isobars are apart.

→ Frictional force :- It affects the speed of the wind. It is greatest at the surface and its influence generally extends upto an elevation of 1 - 3 km. Over the sea surface friction is minimal.

→ Coriolis force :- The rotation of the earth about its axis affects the direction of the wind. This force is called the Coriolis force. 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.

(ii)

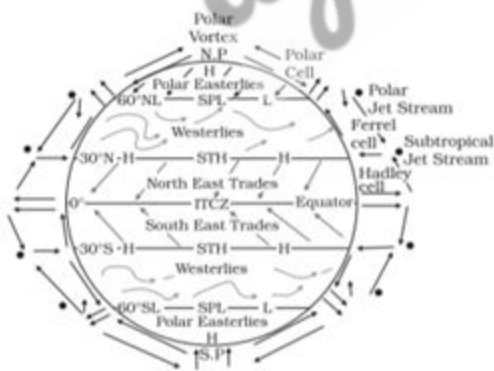


Fig. General circulation of the atmosphere over the globe

The air at the Inter Tropical Convergence Zone (ITCZ) rises because of convection caused by high insolation and a low pressure is created. The winds from the tropics converge at this low pressure zone. The converged air rises along with the convective cell. It reaches the top of the troposphere up to an altitude of 14 km. and moves towards the poles. This causes accumulation of air at about 30° N and S. Part of the accumulated air sinks to the ground and forms a subtropical high. Another reason for sinking is the cooling of air when it reaches 30° N and S latitudes.

Thus Subtropical High Pressure belt is formed over 30° N and S latitudes.

(iii) Tropical cyclones are violent storms that originate over oceans in tropical areas and move over to the coastal areas bringing about large scale destruction caused by violent winds, very heavy rainfall and storm surges. Tropical cyclones originate and intensify over warm tropical oceans. Tropical cyclone require large sea surface with temperature higher than 27°C . With continuous supply of moisture from the sea, the storm is further strengthened.

A mature tropical cyclone is characterised by the strong spirally circulating wind around the centre, called the eye. The diameter of the circulating system can vary between 150 and 250 km. The eye is a region of calm with subsiding air. Around the eye is the eye wall, where there is a strong spiralling ascent of air to greater height reaching the tropopause. The wind reaches maximum velocity in this region, reaching as high as 250 km per hour. Torrential rain occurs in this zone. From the eye wall rain bands may radiate and trains of cumulus and cumulonimbus clouds may drift into the outer region.

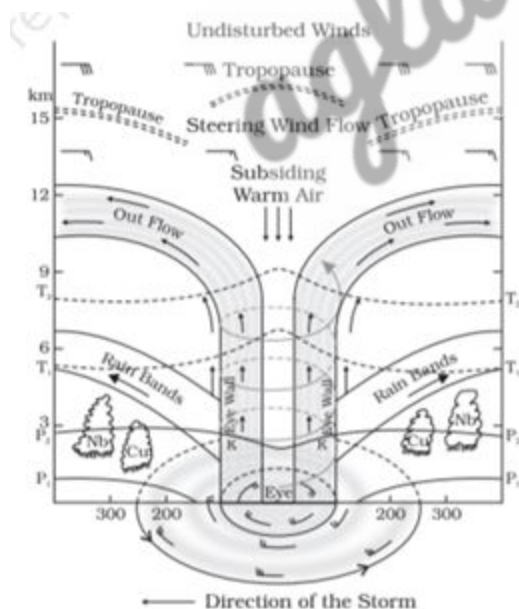


Fig. Vertical section of a Tropical Cyclone

Page : 93 , Block Name : Exercises

aglasem.com