NCERT MOST IMPORTANT QUESTIONS CLASS – 11 GEOGRAPHY CHAPTER- 9 ATMOSPHERIC CIRCULATIONS AND WEATHER SYSTEMS

Question 1.
What is a jet stream? Explain.
Answer:
The winds with a high velocity which blow at high altitude are called the jet stream. This strong current of air is located near 90° north latitude. It affects the weather patterns of the world. High flying planes use these as super tailwinds to save time and fuel.

Question 2.
Describe the local winds in brief.
Answer:
Winds having special characteristics under local conditions are known as local winds.

1. Hot winds: Chinook in Canada and USA, foehn in Switzerland.
2. Dry winds: Sirocco in south Europe, Khanzim in Egypt, Hermatton in West Africa, Simoon of Arabia, Santa Anna of California, Zenda of Argentina.
3. Cold winds: Boro and Mistral in Southern Europe, Pampero in Argentina, Buran in Siberia.

Question 3.
Write a short note on 'doldrums'.
Answer:
The doldrum is an equatorial low-pressure belt between 5°N to 5°S latitudes. It is known as the-belt of calm. The air is constantly heated due to the high temperature. The air expands and rises as convection currents. There are no surface winds. Sailing ships often found them becalmed in this belt due to the absence of backing winds.

Question 4.
What is the importance of air mass?
Answer:
Air mass is important for climatological study. Air masses are related to atmospheric disturbances, cyclones, storms, and fronts.

- The distribution and location of air provide an essential understanding of regional climate.
- Air masses transfer heat from lower latitude to higher latitudes.
- Atmosphericdisturbancesdevelopalongfrontsofdifferentairmasses.

- Air masses are associated with particular types of wind belts and determine the weather characteristics.

Question 5.
What do you understand by valley breeze?
Answer:
The valley breeze occurs during day time. Due to insolation, the valley bottom gets heated. The hot air becomes light and ascends towards the upper slopes. It is known as the valley breeze.

Fig. 10.3: Slopes heated by insolation

Question 6.
Distinguish between:
1. planetary and periodic winds,
2. the sea breeze and land breeze.
Answer:
1. Planetary and periodic winds:
Planetary winds are related to the general circulatory pattern of winds on the rotating earth's surface. These winds constitute the large-scale motion of the atmosphere under the influence of pressure gradients. They ignore seasonal heating and land-water contrast on the earth's surface. They are also called permanent or primary wind system of the earth's surface and comprise trade winds, westerlies, and polar easterlies. These winds blow constantly in a particular direction throughout the year.

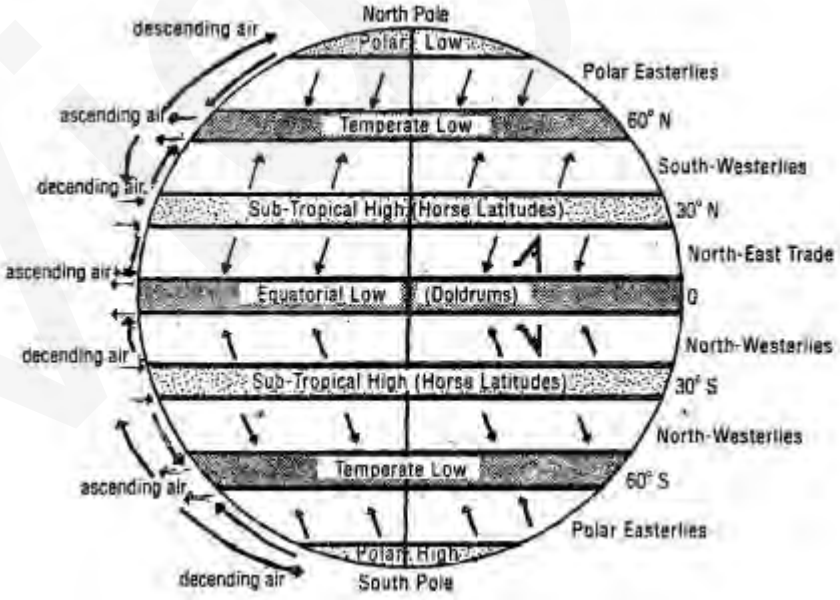


Fig. 10.4: Planetary winds

The winds that change their direction periodically with the change in season are called periodic or secondary winds. Monsoon, air masses and fronts, cyclones and anticyclones, land and sea breezes, and mountain and valley breezes are the wind systems that periodically change their courses diurnally or seasonally.

2. Land and sea breezes:
Daily temperature contacts between land and water produce a small diurnal reversal of winds called land and sea breezes. Both are basically caused by differential heating of land and sea.

During the day, the land gets heated up much faster than the sea. The sea remains comparatively cool with higher pressure, so the sea breeze blows in from the sea to land during the day. Its speed is between 5-20 miles/hour and it is generally stronger in tropical than temperate regions.

Its influence does not normally exceed 15 miles from the coast. It is most deeply felt when one stands facing the sea in a coastal area.

At night, the reverse takes place. As the land cools down much faster than the sea, the cold and heavy air produces a region of local high pressure. The sea conserves its heat and remains quite warm. Its pressure is comparatively low. A land breeze thus blows out from land to sea.

Fishermen in the tropics often take advantage of the outgoing land breeze and sail out with it.

Question 7.
Describe the global pattern of the distribution of pressure.
Answer:
The horizontal distribution of pressure, or its global pattern in general, presents an alternate belt of low and high-pressure areas.

There is an inverse relationship between pressure and temperature. The equatorial region having high temperature has low pressure, while the polar regions with low temperature have high pressure. These pressure belts are thermally induced. Logically, there should have been a gradual increase in pressure from the equator towards the poles.

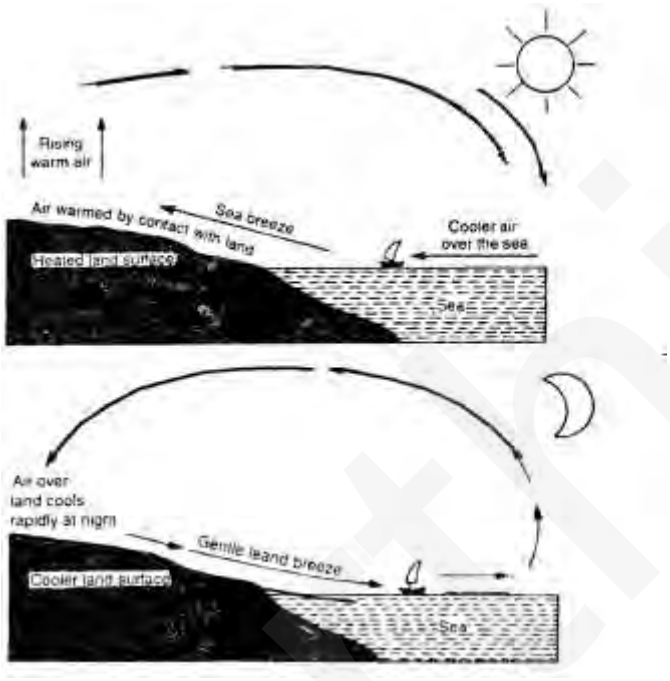
Fig. Pressure belts of the world (See fig.9.1)

There are two intermediate zones of subtropical highs in the vicinity of 30°N and S and two sub-polar lows in the vicinity of 60°N and S. The dynamic control, viz., pressure gradient force, rotation of the earth, are responsible for the formation of these pressure belts.

Thus there are seven pressure belts:

1. An equatorial trough of low pressure.

2. Sub-tropical high-pressure belt (Northern hemisphere)
3. Sub-polar low-pressure belt (Northern hemisphere)
4. Sub-polar low-pressure belt (Southern hemisphere)
5. Sub-tropical high-pressure belt (Southern hemisphere)
6. Polar high (Northern hemisphere)
7. Polar high (Southern hemisphere)



Question 8.
Discuss the seasonal variations in the pressure distribution over the earth's surface.
Answer:
Despite a broad generalized pattern of pressure distribution on the earth, pressure conditions vary considerably on the basis of prevailing weather conditions in different parts of the world. The horizontal distribution of pressure on the earth's surface is shown by isobar. Just as there is a daily range of temperature on the surface of tire earth, so there is the diurnal rhythm of pressure.

The direction and rate of change in pressure are called pressure gradient. It is at right angles to isobars, just as the slope of the land surface is at right angles to contour, lines. The rate of change or steepness of the gradient is shown by the spacing of isobars. Closely spacing isobars show' steep pressure gradient, and widely spaced isobars show' gentle gradient.

The zonal distribution of pressure is modified by continents and oceans, in summer, the relatively hot continents intensify the low-pressure cells and weaken or destroy high-pressure cells. In a similar manner, the corresponding cooler oceans weaken the low-pressure cells and the high-pressure cells. In winter the situation is reversed. ,

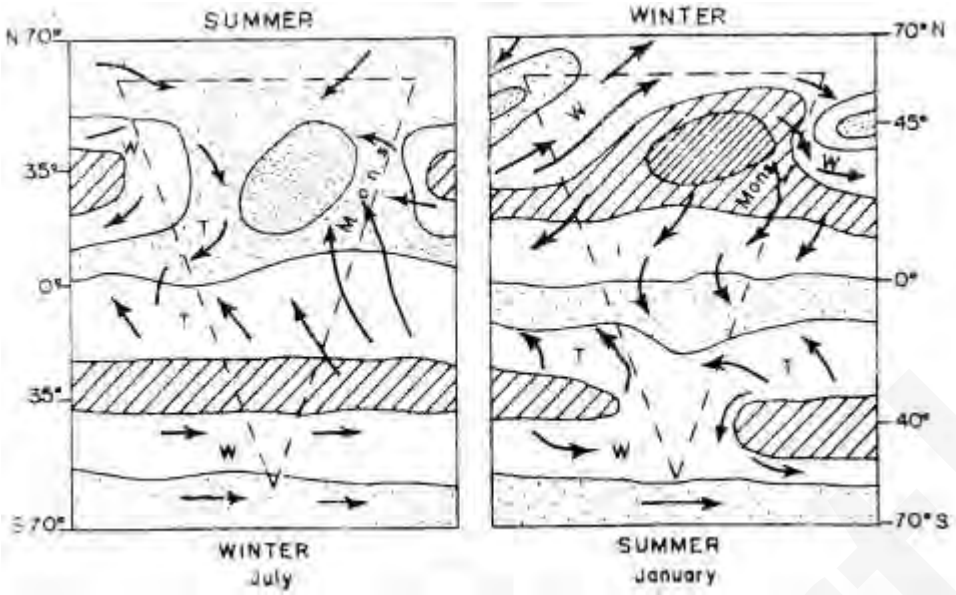


Fig. 10.6: Horizontal distribution of pressure and winds

Question 9.
What are cyclones? Describe the various types of cyclones.
Answer:
Cyclones constitute the most fundamental and climatically the most significant atmospheric disturbances affecting the weather. On the basis of the areas of their origin, they are classified into two types: temperate and tropical.

Temperate cyclones: Temperate1 cyclones are concentrated in the middle latitudes between 35° and 65° in both hemispheres. They are generally extensive having a vertical thickness ranging from 9 to 11 km. and a diameter of about 1,000 km. It is just like a spearhead, having the shape of an upturned 'V'. The approaching temperate cyclones are noticed by the appearance of dark clouds in the background of white clouds.

According to polar front theory, the highs and lows of westerly wind belts result from the interactions and alteration of two contrasting types of air masses, one in the polar region and the other in the subtropics. Cold air from highs moves toward the equator and is deflected westward, forming the northeast and southeast polar winds. Warmer air from the subtropical highs moves toward the poles and by an eastward deflection from the westerly winds.

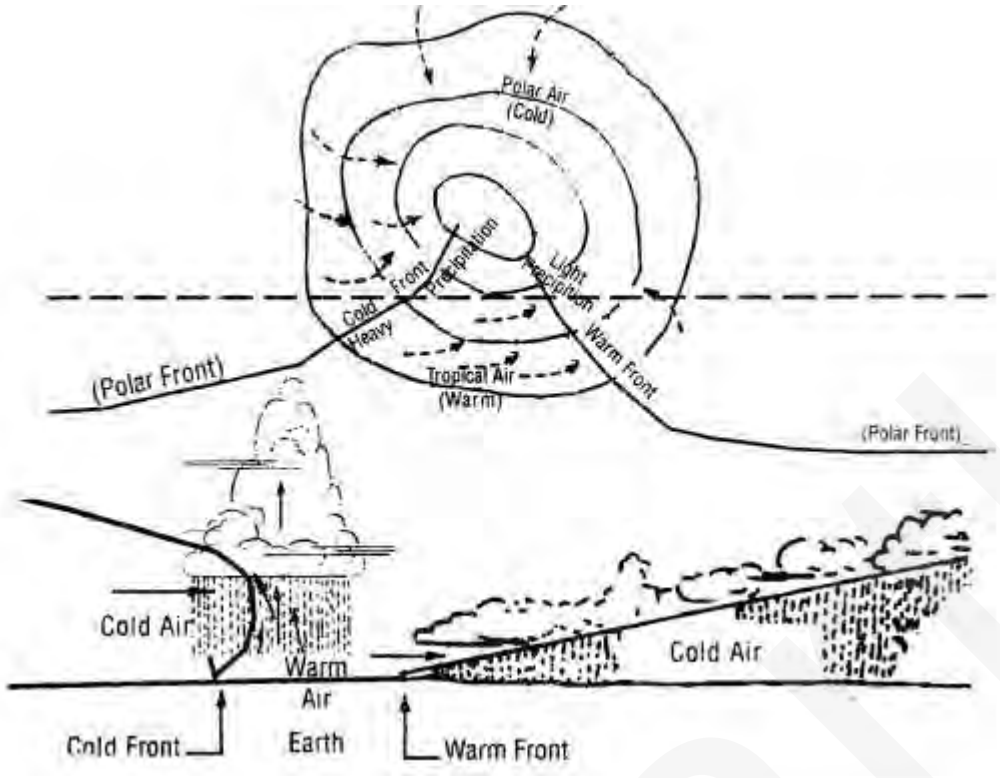


Fig. 10.7: Temperate cyclones

As soon as the cyclone approaches, there is drizzle followed by heavy rainfall. The velocity of the wind increases. On the approach of the warm front, the fall in the pressure stops, and the sky becomes clear. This gives the clue that the center of the cyclones has reached. Immediately after this, the temperature begins to fall and the sky becomes cloudy and raining again. This indicates the approach of a cold front.

Tropical cyclones: These are violent storms that originate over tropical seas and move over the coastal areas bringing about large-scale destruction caused by violent winds, very heavy rainfall, and storm surges. 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 west Australia. The conditions favorable for the formation and intensification of tropical storms are:

- Large sea surface with a temperature higher than 27°C.
- Presence of the Coriolis force.
- Small variations in the vertical wind speed.
- A pre-existing weak low-pressure area or low level cyclonic circulation.
- Upper divergence above the sea level system.

The cyclone creates stone surges and they inundate the coastland. Over the Indian sea, the cyclonic storms occur in the pre-monsoon

Question 10.
Define and describe the fronts.
Answer:
The contact line between air masses of different properties is called a front. A cold front develops where the cold air mass moves under warm air mass and lifts it up. On the other hand, the trailing edge of a cold air mass that is followed by warm air is called a warm front. In each case, precipitation is likely to occur because warm air is rising over the cold air. Thus duration and intensity of precipitation along the few from.s are quite different. The cold front is steep and produces showery and sometimes violet precipitation for a longer period of time. If the cold front moves faster than the warm front in such a trap, part or all the pocket of warm air may be lifted from the surface, thus producing air occluded front. Often exculpation of the air masses lose earlier characters and form new fronts.