

NCERT MOST IMPORTANT QUESTIONS CLASS – 11

GEOGRAPHY CHAPTER- 8 SOLAR RADIATION, HEAT BALANCE AND TEMPERATURE

Question 1.

What is inversion of temperature? When | and in what regions does it take place?

Answer:

At times, the situations are reversed and the normal lapse rate is inverted. It is called Inversion of temperature. Inversion is usually of short duration but quite common nonetheless. A long winter night with clear skies and still air is ideal situation for inversion. The heat of the day is radiated off during the night, and by early morning hours, the earth is cooler than the air above. Over polar areas, temperature inversion is normal throughout the year. Surface inversion promotes stability in the lower layers of the atmosphere.

Smoke and dust particles get collected beneath the inversion layer and spread horizontally to fill the lower strata of the atmosphere. Dense fogs in mornings are common occurrences especially during winter season. This inversion commonly lasts for few hours until the sun comes up and begins to warm the earth. The inversion takes place in hills and mountains due to air drainage.

Question 2.

How does the energy received in upper layer of the atmosphere keep changing at different times of the year?

Answer:

The solar output received at the top of the atmosphere varies slightly in a year due to the variations in the distance between the earth and the sun. During its revolution around the sun, the earth is farthest from the sun (152 million km) on 4th July. This position of the earth is called aphelion. On 3rd January, the earth is the nearest to the sun (147 million km). This position is called perihelion. Therefore, the annual insolation received by the earth on 3rd January is slightly more than the amount received on 4th July.

However, the effect of this variation in the solar output is masked by other factors like the distribution of land and sea, and the atmospheric circulation. Hence, this variation in the solar output does not have great effect on daily weather changes on the surface of the earth.

Question 3.

How does the amount of insolation received depends on the angle of inclination of the rays?

Answer:

The amount of insolation received depends on the angle of inclination of the rays. It depends on the latitude of a place. The higher the latitude the less is the angle they make with the surface of the earth resulting in slant sunrays. The area covered by vertical rays is always less than the slant rays. If more area is covered, the energy gets distributed and the net energy received per unit area decreases. Moreover, the slant rays are required to pass through greater depth of the atmosphere resulting in more absorption, scattering and diffusion.

Question 4.

Explain about spatial distribution of insolation on the earth's surface.

Answer:

The insolation received at the surface varies from about 320 Watt/m² in the tropics to about 70 Watt/m² in the poles. Maximum latitude insolation is received over the subtropical deserts, where the cloudiness is the least. Equator receives comparatively less insolation than the tropics. Generally, at the same latitude the insolation is more over the continent than over the oceans. In winter, the middle and higher latitudes receive less radiation than in summer.

Question 5.

Explain the distribution of temperature in July.

Answer:

Distribution of temperature in July

- During this period the sun shines vertically over head near the tropic of cancer. It is summer for the northern hemisphere and winters for the southern hemisphere.
- In the northern hemisphere the isotherm bends equator wards while crossing the oceans and pole wards 'while crossing the landmass. In the southern hemisphere it is vice-versa.
- The isotherms are most irregular and zig-zig in northern hemisphere on the other hand the isotherms are relatively more regular and straight in southern hemisphere.
- Maximum temperature of about 30 degree centigrade occurs entirely in the northern hemisphere between 10° and 40° north latitude however the lowest temperature below 0° C is recorded over northern hemisphere in the central parts of green land.

Question 6.

Explain the factors affecting insolation at the surface of earth.

Answer:

The factors affecting insolation at the surface of earth are:-

1. The rotation of earth on its axis: The fact that the earth on its axis makes an angle of 6614 with the plane of it's orbit round the sun has a greater influence on the amount of insolation received at different latitudes.

2. The angle of inclination of the sunrays: The higher the latitude the greater is the angle they make with the surface of the earth resulting in slant sunrays. The areas covered by vertical rays is always less than the slant rays. If more areas are covered the energy gets distributed and the net energy received per unit area decreases. Thus, the slant rays are required to pass through greater depth of the atmosphere resulting in more absorption, scattering and diffusion.

3. The transparency of the atmosphere:

The atmosphere is largely transparent to the short wave solar radiation. The incoming solar radiation passes through the atmosphere before striking the earth's surface. Within the troposphere water vapour, ozone and other gases absorb much of the near infrared radiation.

4. The configuration of land in terms of its aspect: The insolation received at the surface varies from about 320 watt/ m² in the poles. Maximum insolation is received over the subtropical deserts, when the cloudiness is the least. Equator receives less rainfall as compared to tropics

Question 7.

Distribution of temperature in the month of July.

Answer:

- During this period the sun shines vertically overhead near tropic of cancer it is the summer for northern hemisphere and winter for southern hemisphere.
- The isotherms are relatively more regular and straight in southern hemisphere.
- Maximum temperature of over 30°C occurs entirely in northern hemisphere between 10° and 40° temperature below 0° C is recorded over northern hemisphere in the central parts of Greenland.

Question 8.

Explain the distribution of temperature in January.

Answer:

1. In January the isotherms deviate to north over the ocean and to the south over the continent. This can be seen on the North Atlantic Ocean.
2. The presence of warm ocean currents, Gulf Stream and north Atlantic drift, make the northern Atlantic Ocean warmer and the isotherms bend towards the north.
3. Over the land the temperature decreases sharply and the isotherms bend towards south in Europe.
4. It is much pronounced in the Siberian plain. The mean January temperature along 60° E longitude is minus 20° both at 80° N and 50° N latitude. The mean monthly temperature for January is over 27° C in equatorial oceans over 24°C in the tropics and 2° C- 0° C in middle latitudes and -18° C to -48° C in Eurasian continental interior.

5. The effect of the ocean is well pronounced in southern hemisphere. Here, the isotherms are more or less parallel to latitudes and the variations in temperature is more gradual than in the northern hemisphere. The isotherm of 20°C, 10°C, and 0°C run parallel to 35°S, 45° and 60°S latitudes respectively.

Question 9.

Explain about inversion of temperature.

Answer:

At times, the situations are reversed and the normal lapse rate is inverted. It is called inversion of temperature. Inversion is usually of short duration but quite common nonetheless. A long winter night with clear skies and still air is ideal situation for inversion. The heat of the day is radiated off during the night, and by early morning hours, the earth is cooler than the air above.

Over polar areas, temperature inversion is normal throughout the year. Surface inversion promotes stability in the lower layers of the atmosphere. Smoke and dust particles get collected beneath the inversion layer and spread horizontally to fill the lower strata of the atmosphere. Dense fogs in mornings are common occurrences especially during winter season. This inversion commonly lasts for few hours until the sun comes up and begins to warm the earth. The inversion takes place in hills and mountains due to air drainage.

Question 10.

Explain the heating and the cooling mechanism of atmosphere.

Or

Discuss the process through which earth and the atmosphere system maintain heat balance.

Answer:

(a) Conduction:

- The earth after being heated by insolation transmits the heat to the atmospheric layers near to the earth in long wave form. The air in contact with the land gets heated slowly and the upper layers in contact with the lower layers also get heated.
- Conduction takes place when two bodies of unequal temperature are in contact with one another, there is a flow of energy from the warmer to cooler body. The transfer of heat continues until both the bodies attain the same temperature or the contact is broken. Conduction is important in heating the lower layers of the atmosphere.

(b) Convection:

- The air in contact with the earth rises vertically on heating in the form of currents and further transmits the heat of the atmosphere. This vertical heating of atmosphere is known as convection.
- The convection transfer of energy is confined only to the troposphere.

(c) Advection:

- The transfer of heat through horizontal movement of air is called advection. Horizontal movement of the air is relatively more important than the vertical movement.
- In tropical regions particularly in northern India during summer season local winds called 'loo' is the outcome of advection process.