LONG ANSWER QUESTION
CHAPTER 4 HEAT

Question 1

How do we read a laboratory thermometer?

Solution

A laboratory thermometer does not have a construction. It has to be read while it is in contact with the material whose temperature is being measured. For example, to record the temperature of warm water, the temperature has to be read while the thermometer is immersed in warm water.

Question 2

How does the fur of the polar bear help it to live in the Arctic region?

Solution Answer

Air is a good heat insulator. Polar Bears that live in the cold Arctic region have thick layers of fur. The fur traps air and forms an excellent heat insulating layer. The layer of trapped air keeps the animals comfortably warm even when the atmospheric temperature drops below -20 degree Celsius.

Question 3

Why does cold water kept in an open container become warm on a hot summer afternoon?

Solution

Cold water kept in an open container acquires heat from the warmer surrounding air on a hot summer afternoon. As a result cold water will become as warm as the air around it due to transfer of thermal energy.

Question 4

How do woolen garments keep us warm?

Solution Answer

Woollen fibre curls and forms air pockets. The air trapped by a woolen garments is made warm by the heat from the body. This keeps the body warm. Moreover, wool is a poor conductor of heat. It does not let the warmth of the body to escape and also prevents cold air from reaching the body. This is how woolen garments keep the body warm in winter.

Question 5

Answer the following in one word each:

(a) The SI unit of heat-

(b) The SI unit of Temperature-

(c) The instrument used to measure the temperature-

(d) The transfer of heat from hotter part to a colder part of an object due to vibration of a particles-

(e) The material that do not conduct heat-

Answer

Solution:

a. Joule
b. Kelvin (K)
c. Thermometer
d. Conduction
e. Insulators

Question 6

State the similarities and differences between the laboratory thermometer and the clinical thermometer.

Solution:

Similarities

- Both are made of glass and consist of long narrow glass tube.
- At one end both of them have a bulb.
- Bulbs of both the thermometers consist of mercury
- Celsius scale is present in both the thermometer

Differences

Clinical Thermometer	Laboratory thermometer
Temperature range if 35 to 42 ^{0} c	Temperature range is -10 to 110 ^{0} c
Used to measure human body temperature	Used to measure temperature in the laboratory
It has kink which prevents immediate backflow of mercury	It does not have a kink

Question 7

Explain the process of convection?

Solution

The transfer of heat in liquids and gases is called **Convection**. The molecules of the liquid or gases that are near the source of the heat get heated first. They become lighter due to the heat and move upwards. The colder particles being heavier take the place and this process continue until the whole liquid or the gas gets heated. That is why the area above the flame of a candle always feels hot but the area on the sides of the candle does not.

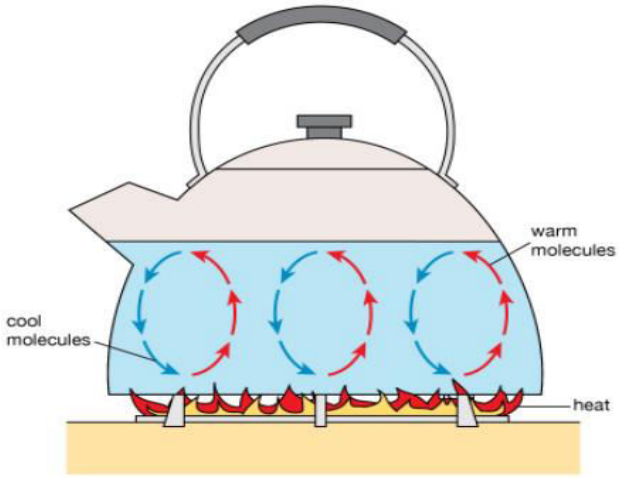

Figure 9 Convection

Question 8

Explain the construction and working of a thermos flask with the help of a labeled diagram?

OR

How does a thermos flask maintain the temperature of liquid kept in it?

(a) A thermos flask is used to maintain the temperature of liquids kept in it. It keeps hot liquids hot or cold liquids cold for a longer time.
(b) The glass is made up of a double wall glass vessel with vacuum between the walls.
(c) Glass being a poor conductor of heat, reducing the transfer of heat from inside the flask as well as outside of it.
(d) Heat that could be transferred through radiation is reduced by silvering the walls of the vacuum flask. This reflects the heat rays either trying to enter the flask from outside or leaving the flask from inside.

Question 9

Explain the how sea breeze occurs?

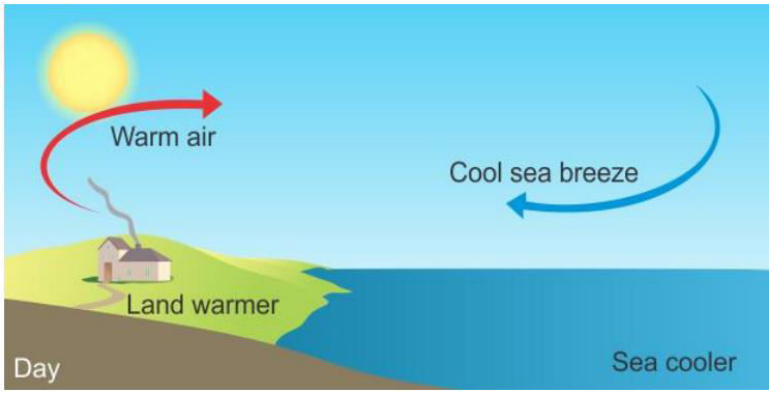

Figure 11 Sea Breeze

Solution

- The wind blowing from the sea towards the land is called **Sea Breeze**.
- During the daytime, the land in the coastal area gets heated due to the sun's radiation.
- The sea also gets heated, however it takes more time to get heated up than the land.

- Hence the air above the land gets heated faster than the air above the sea.
- The hot air from the land rises above as it is lighter and the cool air from the sea being heavier takes its place. This results in the sea breeze.

Question 10

Explain the how Land breeze occurs?

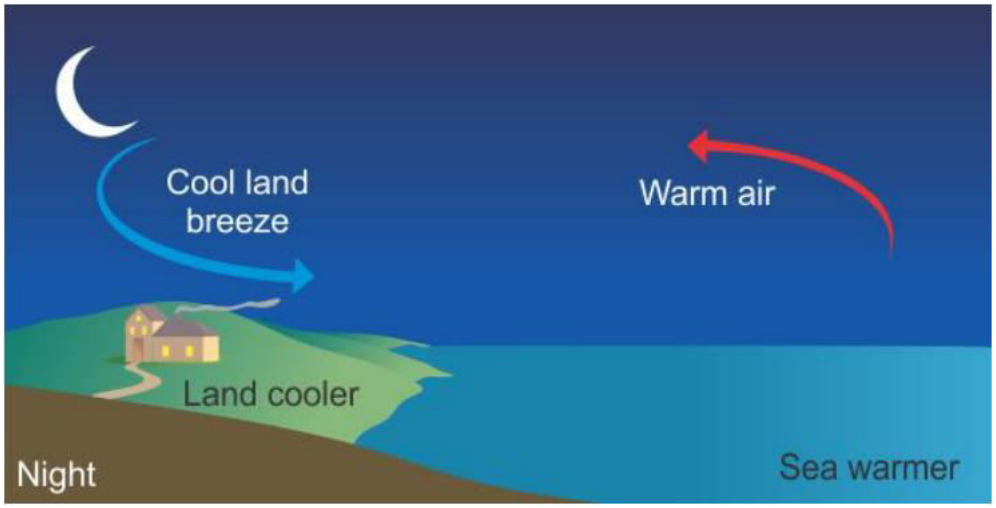

Figure 12 Land breeze

Solution

- The wind blowing from the land towards the sea is called the land breeze.
- During the night time, the land in the coastal areas gets cool down faster than the sea. The air above the sea is hotter than the air above the land.
- Therefore the air above the sea rises and the air from the land being cool flows towards the sea. This results in the land breeze.

Question 11

How do woollen clothes keep us warm?

Solution

- The woollen clothes are a bad conductor of heat.
- Therefore they do not allow the heat from the body to move out in the environment.
- As a result, the air present between the woollen clothes and our body becomes hot and this makes us feel warm.
- Similarly, two thin blankets provide more heat than one thick blanket because air can be trapped between the two thin blankets.