

C. Give reasons for each of the following.

1. A clinical thermometer is given a few jerks before it is used to take a person's temperature.

Ans: The thermometer is given a jerk or shakes to force the mercury back into the bulb. It is then washed with an antiseptic solution and stored carefully.

2. Gases are not good conductors of heat.

Ans: Conduction depends on how closely the particles of the substance are packed together. The molecules in gases are the least bound, which is why gases are poor conductors of heat.

3. Woollen clothes insulate us from the cold.

Ans: Air is a very good insulator. The fibres of woollen coats and jackets trap air between them, insulating the body and preventing the loss of heat.

4. Room heaters are usually installed at the ground level.

Ans: A room heater is usually installed at the level of the ground. The cool air near the ground gets heated and rises. In turn, the cold air near the ceiling rushes down to fill the empty space. This continued movement of hot and cold air sets up a convection current, thereby effectively heating the entire room.

5. Buildings are often painted white.

Ans: The walls and roofs of buildings are often painted white (or in light colours). This keeps the roofs and walls cool during summer because white is a good reflector of heat.

D. Answer the following questions in one word or a sentence.

1. Which scale of temperature is used in India?

Ans: Celsius scale

2. What is the working principle of a liquid thermometer?

Ans: The liquid expands on getting heated or due to the rise in temperature.

3. What is the average temperature of the human body in various scales?

Ans: 37 degrees Celsius and 98.6 degrees Fahrenheit

4. What is conduction?

Ans: The transfer of heat from a hotter object to a colder object when they are in contact with each other is called conduction

5. In which states of matter does convection take place?

Ans: Convection takes place in gases or liquids.

E. Answer the following questions in brief.

2. Why do clinical thermometers measure a limited range of temperatures?

Ans: A clinical thermometer is used to measure the temperature of the human body. Its temperature range is from 35°C to 42 °C because the temperature of the human body varies only within this range. The average normal body temperature of a healthy person is 37°C.

3. Write a short note on clinical thermometers.

Ans: The capillary tube of the clinical thermometer has a small bend near the bulb. It prevents the mercury from flowing back into the bulb on its own before the temperature reading is taken. To measure the temperature, the thermometer is placed the tongue or under the arm of the person. The mercury in the bulb expands due to the heat from body, rises in the capillary tube. When the thermometer is removed from contact with the body, the mercury in the bulb cools and contracts.

4. Why do we install air conditioners high up in a room?

Ans: An air-conditioner is installed high up on the wall so that it cools the warm air that rises. The cooled air then comes down setting up a convection current that cools the room.

5. Why do we wear dark-coloured clothes in winter and light-coloured clothes?

Ans: We prefer to wear light-coloured clothes in summer as they reflect more heat from sunlight than they absorb. We wear dark-coloured clothes in winter as they absorb more heat from sunlight and help to keep us warm

F. Answer the following questions in detail.

2. Write any four practical applications of transfer of heat by conduction.

Ans: Four practical applications of transfer of heat by conduction are:

- Metals such as aluminum, brass, steel and copper are used to make kitchen utensils as they heat up quickly.
- The handles of kitchen utensils are made of insulators such as wood and Bakelite so that hot utensils can be handled easily.
- Insulators such as plastics, cement or wood are used to make benches in public places so that they do not become either too hot or too cold.
- Water storage tanks on rooftops are made of plastic to keep the water from getting too hot or too cold.

4. State the differences between three different modes of transfer of heat.

| Conduction | Convection | Radiation |
|--|---|---|
| The transfer of heat takes place without the actual movement of molecules. They merely vibrate in their fixed positions. | The transfer of heat takes place with the actual movement of molecules. | The transfer of heat takes place through waves. No movement of molecules is involved. |
| Heat is transferred between two solid objects in contact with each other | Heat is transferred within a liquid or a gas. | Heat is transferred without any medium and can take place even in vacuum |
| It is generally a slow process | It is faster than conduction. | This is the fastest mode of heat transfer |
| It is used in heating metals, cooking, etc. | It is used in cooling air. It also causes land breeze and sea breeze. | Sun's radiation reaches Earth by radiation |

5. How does a thermos flask help to keep a hot drink warm? Draw a labelled diagram of a thermos flask.

Ans: A thermos flask consists of a double-walled container made of glass or stainless steel. Both the walls are polished, so they are shiny. They prevent heat loss through radiation by reflecting any radiated heat back into the flask. The space between the walls is vacuum. This prevents heat loss through convection as there are no air molecules to carry out the transfer of heat. The mouth of the flask is closed with either cork or a plastic cap. The glass bottle is placed in a metal or plastic outer casing that prevents the loss of heat through conduction. Corks or other insulating materials support the glass bottle within the casing. The substance within the flask thus maintains its temperature for a long time.

G. Out of the box!

- Why is it easier to hold a glass tumbler of warm water than a steel tumbler containing water at the same temperature?

Ans: Glass tumbler is an insulator, while steel is a good conductor. Conductors get heated faster than insulators.

- In an essay on the transfer of heat, Kunal wrote that in a given situation, heat is transferred using only a single mode at a time. Is he right or wrong? Explain your answer with an example.

Ans: At a time, transfer of heat can involve one or more methods. For example, water in a stainless steel pan gets heated using two modes of heat transfer--the stainless steel pan gets heated by conduction. The hot pan then transfers its heat to water at the bottom of the pan through conduction. Heat from the lower level of water reaches the top level by convection. Heat from the hot water at the top of the pan is lost through radiation. Similarly, hot pan also loses some of the heat through radiation.