Chapter 4
Heat

Q1. Fill in the blanks.

i. The hotness of an object is determined by its temperature.

ii. Temperature is measured in degree celsius.

iii. A cold steel spoon is dipped in a cup of hot milk. It transfers heat to its other end by the process of conduction.

iv. Land breeze blows during night.

v. Sea breeze blows during day.

vi. Dark coloured clothes are preferred during winter.

vii. Poor conductors are known as insulators.

Q2. True/False

i. Temperature of boiling water cannot be measured by a clinical thermometer. True

ii. Medium is required for transfer of heat by the process of radiation. False

iii. Clothes of dark colours absorb heat better than clothes of light colours. True

iv. Light coloured clothes are preferred during summer. True

v. We should hold the thermometer by the bulb while holding it. False

vi. The bulb of laboratory thermometer should not touch the bottom or the sides of the container. True

Q3. In which direction does the smoke go?

Ans. Smoke will go upward.

Q4. What do you mean by temperature?

Ans. A reliable measure of the hotness of an object is its temperature.

Q5. Which device is used to measure temperature?

Ans. Thermometer is used to measure temperature.

Q6. What is that silver stuff in a thermometer?
Ans. Silver stuff in a thermometer is mercury.

Q7. What is the unit of temperature as adopted by India?

Ans. India has adopted the celsius scale.

Q8. What is the normal temperature of a human being?

Ans. The normal temperature of human body is 37°C.

Q9. What is the range of a laboratory thermometer?

Ans. The range of a laboratory thermometer is generally from –10°C to 110°C.

Q10. What is the use of the kink in clinical thermometer?

Ans. It prevents mercury level from falling on its own.

Q11. How does heat flow from one object to another?

Ans. Heat flows from a hotter object to a colder object.

Q12. Does transfer of heat by radiation require any medium?

Ans. The transfer of heat by radiation does not require any medium.

Q13. Do all hot bodies radiate heat?

Ans. Yes, all hot bodies radiate heat.

Q14. How does heat transfer in liquids and gases?

Ans. In liquids and gases the heat is transferred by convection.

Q15. Will heat transfer if the temperature of two objects is the same?

Ans. Heat will not be transferred if the temperature of two objects is the same.

Q16. What should be the level of mercury in the clinical thermometer before use?

Ans. Mercury level should be below 35°C.

Q17. How does heat transfer in solids?

Ans. In solids, generally, the heat is transferred by the process of conduction.

Q18. What is the best way to clean a thermometer?

Ans. Thermometer should be washed before and after use, preferably with an antiseptic solution.

Q19. What is Conduction?

Ans. The process by which heat is transferred from the hotter end to the colder end of an object is known as conduction.

Q20. What are insulators of heat?

Ans. The materials which do not allow heat to pass through them easily are insulators of heat. Example: plastic and wood.

Q21. What are conductors of heat?

Ans. The materials which allow heat to pass through them easily are conductors of heat. Example: aluminum, iron and copper.

Q22. What is clinical thermometer?

Ans. The thermometer that measures our body temperature is called a clinical thermometer.

Q23. Give two examples each of conductors and insulators of heat.

Ans. Conductors – aluminum and copper

Insulators - water and air

Q24. How does the heat travel in air?

Ans. The air near the heat source gets hot and rises. The air from the sides comes in to take its place. In this way the air gets heated.

Q25. What do you understand by heat?

Ans. Heat is a form of energy that can be transferred from one object to another or even created at the expense of the loss of other forms of energy.

Q26. What is the use of maximum-minimum thermometer?

Ans. The maximum and minimum temperatures of the previous day, reported in weather reports, are measured by maximum-minimum thermometer.

Q27. One litre of water at 30°C is mixed with one litre of water at 50°C. The temperature of the mixture will be

(a) 80°C (b) more than 50°C but less than 80°C

(c) 20°C (d) between 30°C and 50°C.

Ans. (d) between 30°C and 50°C.

Q28. Why does the mercury not fall or rise in a clinical thermometer when taken out of the mouth?

Ans. Clinical thermometer has kink near the bulb prevents mercury level from falling on its own.

Q29. Why clinical thermometer cannot be used to measure high temperatures?

Ans. Clinical thermometer cannot be used to measure high temperatures because the range of this thermometer is from 35°C to 42°C only.

Q30. Explain land breeze.

Ans. At night, the water cools down more slowly than the land. So, the cool air from the land moves towards the sea. This is called the land breeze.

Q31. What is the concern associated with the use of mercury thermometer?

Ans. There is a lot of concern over the use of mercury in thermometers. Mercury is a toxic substance and is very difficult to dispose of if a thermometer breaks.

Q32. Explain the construction of clinical thermometer.

Ans. A clinical thermometer consists of a long, narrow, uniform glass tube. It has a bulb at one end. This bulb contains mercury. Outside the bulb, a small shining thread of mercury can be seen.

Q33. In places of hot climate it is advised that the outer walls of houses be painted white. Explain.

Ans. In places of hot climate it is advised that the outer walls of houses be painted white because light color reflects most of the heat that falls on them and thus keep the house cool.

Q34. Is it possible to construct buildings that are not affected much by heat and cold outside?

Ans. This can be done by constructing outer walls of buildings so that they have trapped layers of air. One way of doing this is to use hollow bricks, which are available these days.

Q35. What do you mean by maximum-minimum thermometer?

Ans. Different types of thermometers are used for different purposes. The maximum and minimum temperatures of the previous day, reported in weather reports, are measured by a thermometer called the maximum - minimum thermometer.

Q36. Why clinical thermometers range from 35°C to 42°C?

Ans. The clinical thermometer is designed to measure the temperature of human body only. The temperature of human body normally does not go below 35°C or above 42°C. That is the reason that this thermometer has the range 35°C to 42°C.

Q37. Discuss why wearing more layers of clothing during winter keeps us warmer than wearing just one thick piece of clothing.

Ans. Wearing more layers of clothing during winter keeps us warmer than wearing just one thick piece of clothing because air get trapped in between the layers of clothing and being a bad conductor of heat, prevents the flow of heat from our body to the cold surroundings.

Heat

Q38. When we come out in the sun, we feel warm. How does the heat from the sun reach us?

Ans. It cannot reach us by conduction or convection as there is no medium such as air in most part of the space between the earth and the sun. From the sun the heat comes to us by another process known as radiation. The transfer of heat by radiation does not require any medium.

Q39. In summer we prefer light-coloured clothes and in winter we usually wear dark-coloured clothes. Why is it so?

Ans. Dark surfaces absorb more heat and, therefore, we feel comfortable with dark coloured clothes in the winter. Light coloured clothes reflect most of the heat that falls on them and, therefore, we feel more comfortable wearing them in the summer.

Q40. What is sea breeze?

Ans. During the day, the land gets heated faster than the water. The air over the land becomes hotter and rises up. The cooler air from the sea rushes in towards the land to take its place. The warm air from the land moves towards the sea to complete the cycle. The air from the sea is called the sea breeze.

Q41. Two thin blankets joined together are usually warmer than one thick blanket. Give reason.

Ans. Two thin blankets joined together are usually warmer than one thick blanket because air gets trapped between the layers of blankets and being a bad conductor of heat, prevents the flow of heat from our body to the cold surroundings.

Q42. How water gets heated when kept on flame?

Ans. When water is heated, the water near the flame gets hot. Hot water rises up. The cold water from the sides moves down towards the source of heat. This water also gets hot and rises and water from the sides moves down. This process continues till the whole water gets heated. This mode of heat transfer is known as convection.

Q43. An iron ball at 40°C is dropped in a mug containing water at 40°C.

The heat will

(a) flow from iron ball to water.

(b) not flow from iron ball to water or from water to iron ball.

(c) flow from water to iron ball.

(d) increase the temperature of both.

Ans. (b) not flow from iron ball to water or from water to iron ball.

Q44. A wooden spoon is dipped in a cup of ice cream. Its other end

(a) becomes cold by the process of conduction.

(b) becomes cold by the process of convection.

(c) becomes cold by the process of radiation.

(d) does not become cold.

Ans. (d) does not become cold.

Q45. Stainless steel pans are usually provided with copper bottoms. The reason for this could be that

(a) copper bottom makes the pan more durable.

(b) such pans appear colourful.

(c) copper is a better conductor of heat than the stainless steel.

(d) copper is easier to clean than the stainless steel.

Ans. (c) copper is a better conductor of heat than the stainless steel.

Q46. State the similarities and differences between the laboratory thermometer and the clinical thermometer.

Ans. Similarities

i. Both thermometers consist of a long, narrow, uniform glass tube.

ii. Both have a bulb at one end. This bulb contains mercury.

iii. Both have celsius scale.

Differences

i. A clinical thermometer reads temperature from 35°C to 42°C whereas the range of a laboratory thermometer is generally from –10°C to 110°C.

ii. A clinical thermometer has a kink in it whereas there is no kink in laboratory thermometer.

Q47. What are the precautions that need to be observed while reading a clinical thermometer?

Ans. Precautions to be observed while reading a clinical thermometer

i. Thermometer should be washed before and after use, preferably with an antiseptic solution.

ii. Ensure that before use the mercury level is below 35°C.

iii. Read the thermometer keeping the level of mercury along the line of sight.

iv. Handle the thermometer with care. If it hits against some hard object, it can break.

v. Don’t hold the thermometer by the bulb while reading it.

Q48. State the precaution to be observed while using a laboratory thermometer.

Ans. Precaution to be observed while using a laboratory thermometer

i. Handle the thermometer with care. If it hits against some hard object, it can break.

ii. Thermometer should be kept upright not tilted.

iii. Bulb should be surrounded from all sides by the substance of which the temperature is to be measured. The bulb should not touch the surface of the container.

iv. Do not move the thermometer while measuring the temperature of the substance.

v. Read the temperature of the object when the thermometer is in the substance.

Q49. Why can't we use a laboratory thermometer to measure human body temperature?

Ans. We can’t use a laboratory thermometer to measure human body temperature because the range of a laboratory thermometer is high generally from –10°C to 110°C while the normal body temperature of human body is 37°C. Moreover, a laboratory thermometer does not have a kink, so the mercury falls on its own upon removing it from the body orifice. Thus, it does not give accurate temperature of the human body.