Chapter 4. Heat

Very Short Q&A:

Q1: Define temperature.

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

Q2: Name the device used to measure temperature.

Ans: Thermometer.

Q3: Name the two types of thermometer.

Ans: Clinical thermometer and laboratory thermometer.

Q4: What do you mean by clinical thermometer?

Ans: Thermometer means to measure our body temperature is called clinical thermometer.

Q5: The bulb in thermometer contains _____.

Ans: Mercury.

Q6: Thermometer should be washed before and after use with, preferably with an _____ solution.

Ans: Antiseptic solution

Q7: Before use the mercury level of thermometer should be below_____.

Ans: 35°c

Q8: We should hold the thermometer by the bulb while holding it. True/False.

Ans: False

Q9: What is the unit of temperature as adopted by India?

Ans: Degree Celsius (°c)

Q10: What is the average body temperature of a healthy person?

Ans: 37°c

Q11: What is the range of laboratory thermometer?

Ans: - 10°c to 110°c

Q12: Laboratory thermometer should be kept upright and not tilted. True/False.

Ans: True.

Q13: The bulb of laboratory thermometer should not touch the surface of the _____.

Ans: Container.

Q14: What is the use of kink in a clinical thermometer?

Ans: Kink prevents mercury level from falling on its own.

Q15: Give an example to show the transfer from heat from one body to another.

Ans: Any utensil kept on flame, becomes hot because heat transfers from flame to the utensil.

Q16: Heat always flows from a hotter object to _____.

Ans: Colder object.

Q17: In solid heat is transferred by the process of

a. Conduction
b. convection
c. Radiation
d. None of these

Ans: Conduction.

Q18: Give examples of conductors.

Ans: Aluminium, copper, iron etc.

Q19: Give examples of insulators.

Ans: Water, air, etc.

Q20: Insulators are _____ conductor of heat.

Ans: Poor

Q21: Conductors are _____ conductor of heat.

Ans: Good

Q22: Name the process by which heat transfer in air.

Ans: Convection.

Q23: From the sun the heat comes to us by the process called _____.

Ans: Radiation.

Q24: Transfer of heat by radiation requires any medium or not?

Ans: Not.

Q25: All hot bodies _____ heat.

Ans: Radiates.

Q26: An iron rod at 30°c is dropped by chance into a bucket containing water at 30°c, the heat will flow or not in this case?

Ans: No.

Q27: An wooden spoon is dipped in a cup of ice-cream ,its other end

a. Becomes clod by the process of convention
b. Becomes hot by the process of conduction
c. Does not become cold
d. None of these.

Ans: Does not become cold

Q28: Which of the two absorbs more radiation- a dark coloured object or a light coloured object?

Ans: A dark coloured object.

Q29: Temperature of boiling water cannot be measured by a _____.

Ans: Clinical thermometer.

Q30: Land breeze blows at the time of _____.

Ans: Night.

Q31: Sea breeze blows at the time of _____.

Ans: Day

Q32: Which type of cloth should be preferredin the month of June?

Ans: Light coloured clothes

Q33: Which type of cloth should be preferredin the month of January?

Ans: Dark coloured clothes.

Q34: A cold steel spoon is dipped into a cup of hot coffee, it will transfer heat to its other end or not? If yes then by which process?

Ans: Yes, by conduction.

Q35: One litre of water at 30°c is mixed with one litre of water at 48°c, the temperature of the mixture will be.

a. 48°c
b. 30°c
c. Between 30°c and 48°c
d. More than 48°c

Ans: Between 30°c and 48°c

Short Q&A:

Q1: Define heat.

Ans: Heat is a form of energy, entry or exit of which correspondingly increases or decreases internal energy of a body when no work is done on the body or by the body. It is measured in joule or calories.

Q2: Define temperature. What is its unit?

Ans: A reliable measure of the hotness of an object is its temperature. Temperature is measured by a device called thermometer. Unit of temperature is degree Celsius (°C), Fahrenheit and Kelvin (SI unit).

Q3: What is the use of the 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 m a x i m u m - m i n i m u m thermometer.

Q4: Why does the mercury not fall or rise in a clinical thermometer when taken out of the mouth?

Ans: Kink prevents mercury level from falling on its own.

Q5: Why clinical thermometer ranges from 35oC to 42oC.?

Ans: The normal temperature of human body is 37°C.The temperature of human body normally does not go below 35oC or above 42oC. That is the reason that a clinical thermometer has the range 35oC to 42oC.

Q6: What is conduction?

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

Q7: Why conduction is only possible in solids?

Ans: In solids, generally, the heat is transferred by the process of conduction because particles of solids are closely packed and heat is transferred from the hotter end to the colder end of an object.

Q8: 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 a different process known as radiation which does not require any medium for heat transfer.

Q9: Explain how water heated by convection?

Ans: The water is poor conductor of heat so do not heated by conduction. When water is heated, the water became lighter. Hot water rises up. The cold water from the sides moves down towards the source of heat. This water also gets hot and rises upward 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.

Q10: Differentiate between conductor and insulators?

Ans: The materials which allow heat to pass through them easily are conductors of heat. For examples, aluminium, iron and copper The materials which do not allow heat to pass through them easily are poor conductors of heat known as insulators such as plastic and wood.

Q11: 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.

Q12: Explain sea breeze.

Ans: During the day, the land gets heated faster than the water. The air over theland 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.

Q13: In summer we prefer light-coloured clothes and in winter we usually wear dark-coloured clothes. Explain Why?

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

Q14: Why one thick blanket is less warm up than two thin blankets joined together?

Ans: There is a layer of air in between the blankets. Since air is bad conductor of heat prevent body heat to escape out, two thin blankets provides more heat than one thick blanket.

Q15: How Woollen clothes keep us warm in winter?

Ans: Woollen clothes keep us warm during winter. It is so because wool is a poor conductor of heat and it has air trapped in between the fibres.

Q16: What is the Relation between Celsius, Fahrenheit and Kelvin scales?

Ans: Since the range of temperature from ice-point to steam-point is equal in all the three scales, 100 centigrade degrees = (212 - 32) or 180 Fahrenheit degrees = (373 - 273) or 100 absolute degrees. We consider three thermometers in the above three scales are dipped simultaneously in a liquid of certain temperature. Let the temperatures recorded in the Celsius, Fahrenheit and Kelvin thermometers respectively be C, F and K. Now it can be proved that C / 5 = F- 32 / 9 = K- 273 /5.

Q17: What is the unit of heat?

a. C.G.S. unit of heat is Calorie.
b. The M.K.S. or S.I. unit of heat is Joule
   1 calorie equals 4.18 or 4.2 joules approximately.

Ans: Units of Heat

Q18: What are the factors on which the quantity of heat absorbed or given out by a substance during a thermal change depends?

Ans: The quantity of heat absorbed or given out by a substance during a thermalchange depends on

a. mass:: A larger mass of a substance absorbs or gives out more heat than a smaller mass of it for a certain change of temperature. So, if 'H' be the quantity of heat absorbed or given out by a substance of mass 'm' for a given change of temperature, H = m.
b. difference of temperature:The heat absorbed or released by a certain quantity of a given substance increases or decreases accordingly as the difference between the initial and final temperatures is large and small. Thus, H= (T-t) where, (T-t) is the difference between the initial and the final temperatures of the body.
c. Specific heat of the material of the substance:This is a fundamental property of matter. An equal mass of different materials absorb or give out different quantities of heat, even if they are heated or cooled through the same range of temperature.This is also called specific heat capacity (abbreviated as SHC) in S.I. system.

Q19: State similarities between the laboratory thermometer and the clinical thermometer.

Ans:

- Laboratory thermometer and the clinical thermometer consist of a long, narrow, uniform glass tube.
- Laboratory thermometer and the clinical thermometer have a bulb containing mercury at the end of the tube.
- Laboratory thermometer and the clinical thermometer are marked with Celsius scale on the glass tube.

Q20: Discuss why wearing more layers of clothing during winter keeps us warmer than wearing just one thick piece of clothing.

Ans: In between the layers of cloths there is trapped air. As air is bad conductor of heat so the outside low temperature does not get transferred to body as well as prevent our body heat to escape outside. Hence more layers of cloths keep us warmer during cold winter.

Q21: 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 a light colour absorbs very less radiant heat and we feel comfortable inside such houses due to lower temperature inside house.

Q22: How heat and temperature of substance are related to each other.

Ans: Heat is the total energy of the molecular motion of the substance and temperature is the measure of average energy of the molecular motion in the substance. When we heat a substance it increases the motion of vibrating molecules of the substance thereby increasing the temperature of the substances.

Q23: State differences between laboratory thermometer and clinical thermometer.

Ans:

Clinical thermometer	Laboratory thermometer
a. It is used to measure the temperature of human body only b. It has temperature range from 35oC. to 42oC. c. It has a small constriction near the mercury bulb d. It can be tilted while taking reading	a. It is used to measure the temperature of different objects in laboratory and factories b. It has temperature range from -10oC.to 110oC. c. Usually it does not have any constriction d. It has to be kept upright while taking the reading

Q24: Define specific heat.

Ans: Specific heat is a fundamental property of matter. An equal mass of different materials absorb or give out different quantities of heat, even if they are heated or cooled through the same range of temperature.This is also called specific heat capacity (abbreviated as SHC) in S.I. system.

Q25: What you should choose in winter one thick blanket or two thin blankets joined together? And why?

Ans: There is a layer of air in between the blankets. Since air is bad conductor of heat prevent body heat to escape out, two thin blankets provides more heat than one thick blanket.

Q26: What is thermal equilibrium?

Ans: Heat always from a body of higher temperature to a body of lower temperature, until the temperature of both bodies are equal, then the two bodies are said to be in thermal equilibrium.

Q27: Which property of liquids is used in making thermometer?

Ans: The property of thermal expansion of liquids is used in making thermometers. It states liquid expands on heating and contracts on cooling.

Q28: What are the different temperature scales used? What are the relations among them?

Ans:

Different temperature scales used are:
Kelvin scale (k)
Degree Celsius (°c)
Fahrenheit (F)

Long Q&A:

Q1: Explain different thermometer scales?

Ans:

In between the layers of cloths there is trapped air. As air is bad conductor of heat so the outside low temperature does not get transferred to body as well as prevent our body heat to escape outside. Hence more layers of cloths keep us warmer during cold winter.

Q2: Explain laboratory and clinical thermometer along with their function, and uses.

Ans:

a. mass:: A larger mass of a substance absorbs or gives out more heat than a smaller mass of it for a certain change of temperature. So, if 'H' be the quantity of heat absorbed or given out by a substance of mass 'm' for a given change of temperature, H = m.
b. difference of temperature:The heat absorbed or released by a certain quantity of a given substance increases or decreases accordingly as the difference between the initial and final temperatures is large and small. Thus, H= (T-t) where, (T-t) is the difference between the initial and the final temperatures of the body.
c. Specific heat of the material of the substance:This is a fundamental property of matter. An equal mass of different materials absorb or give out different quantities of heat, even if they are heated or cooled through the same range of temperature.This is also called specific heat capacity (abbreviated as SHC) in S.I. system.