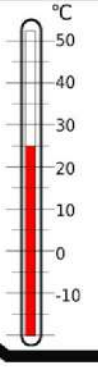

UNIT 8

THERMAL PROPERTIES OF MATTER

SHORT QUESTIONS

Q.1 Define heat. **(LHR 2014)**

Ans: Heat is the energy that is transferred from one body to the other in thermal contact with each other as a result of the difference of temperature.

Q.2 Define thermometry and temperature. **(LHR 2014, GRW 2015)**

Ans:

Thermometry

"The art of measuring temperature is termed as thermometry."

Temperature

"Degree of coldness or hotness of the body is a measure of its temperature"

Q.3 Define internal energy.

Ans: The sum of kinetic energy and potential energy associated with the atoms, molecules and particles of a body is called the internal energy.

Q.4 Define thermal equilibrium.

Ans: "According to the principle of thermometry, if two objects at different temperatures are joined together, after a certain time they attain the same temperature. This is known as the state of thermal equilibrium"

Q.5 Define thermometer. **(LHR 2013)**

Ans: "The instrument which is used to measure the temperature is called a thermometer"

Q.6 Write down the conversions of thermometer scales. **(LHR 2013, GRW 2014, 2015)**

Ans: Conversion of one temperature scale to the other by the given formulae T_F, T_c, T_K representing the Fahrenheit, centigrade (Celsius) and Kelvin temperatures respectively.

Conversion of Celsius (centigrade) to Fahrenheit scale

$$T_F = \frac{9}{5} \times T_c + 32$$

Conversion of Fahrenheit to Celsius scale

$$T_c = \frac{5}{9}(T_F - 32)$$

Relationship between Kelvin and Celsius scales

$$T_k = T_c + 273$$

Q.7 Define specific heat? **(GRW 2013, 2014 , 2016 LHR 2015)**

Ans: "Specific heat of a substance is the amount of heat that required to raise the temperature of 1 kg mass of that substance through 1K".

Q.8 Define heat capacity. **(GRW 2015)**

Ans: Heat capacity of a body is the quantity of thermal energy absorbed by it for one Kelvin (1K) increases in its temperature.

Q.9 Define latent heat of fusion. **(GRW 2013, 2015)**

Ans: "Heat energy required to change unit mass of a substance from solid to liquid state at its melting point without change in the temperature is called its latent heat of fusion".

Q.10 Define latent heat of vaporization. (GRW 2014)

Ans: "The quantity of heat that changes unit mass of a liquid completely into gas at its boiling point without any change in its temperature is called its latent heat of vaporization"

Q.11 Define evaporation.

Ans: "Evaporation is the changing of a liquid into vapors (gaseous state) from the surface of the liquid without heating it".

Q.12 What is linear Expansion?

Ans: "If a thin rod is heated, there is a prominent increase in its length as compared to its cross-sectional area. The expansion along length or in one dimension is called linear expansion".

Q.13 What is volume expansion? (GRW 2013)

Ans: "Heating a block causes an increase in length, breadth and thickness, i.e., volume of the block increases that is known as volume expansion".

Volume of a solid also changes with the change in temperature and is called volume thermal expansion or cubical thermal expansion.

Q.14 Write down some consequences of thermal expansion.

Ans: The expansions of solids many damage bridges, railway tracks and roads as they are constantly subjected to temperature changes.

- Prevision is made during construction for expansion and contraction with temperature.
- Railway tracks buckled on a hot summer day due to expansion if gaps are not left between sections.

Q.15 Write down some applications of thermal expansion.

Ans: Thermal expansion is used in our daily life. In thermometers, thermal expansion is used in temperature measurements.

- To open the cap of a bottle that is tight enough, immerse it in hot water for a minute or so. Metal cap expands and becomes loose. It would now be easy to turn it to open.
- To join steel plates tightly together, red hot rivets are forced through holes in the plates as shown in figure. The end of hot rivet is then hammered. On cooling, the rivets contracts and bring the plates tightly griped.

Q.16 What do you know about bimetallic strip (thermostat)?

Ans: A bimetal strip consists of two thin strips of different metals such as brass and iron joined together as shown in figure. On heating the strip, brass expands more than iron. This unequal expansion causes bending of the strip.

Usage

Bimetal strips are used for various purposes.

- Bimetal thermometers are used to measure temperature especially in furnaces and ovens.
- Bimetal thermo state switch is used to control the temperature of heater coil in an electric iron.

Q.17 Write down some examples of expansions of solids.

- Pipes passing through deserts and plains are curved to allow expansion and contraction due to change of season.
- While laying rail tracks gaps are left at joints so as to avoid damages caused by expansion or contraction.

Q.18 While constructing bridges, one end of the beam is placed on rollers. Explain why?

Ans: This is because the iron beam of the bridges expands due to heat in summer. The iron beams are frightened at one end, keeping the other moveable as provision for their expansion. In the absence of such provision, bridge may be damaged in summer due to heat.

Q.19 What is the difference between specific heat and latent heat of a material?

Specific heat	Latent heat
• Specific heat is the amount of heat required to raise the temperature of unit mass of a substance through one Kelvin. • Its unit is $Jkg^{-1}K^{-1}$.	• Latent heat is the amount of heat that is required to convert a unit mass from solid to liquid or liquid to gas at constant temperature. • It unit is Jkg^{-1}.

Q.20 Why temperature of a substance does not change while it is changing its state from solid to liquid?

Ans: When a substance is changing from solid to liquid state, the temperature of the substance remains the same. It is because the heat supplied to the substance is used to overcome the attractive force among the atoms or molecules of the solid and not to increase the temperature.