Heat

1. **What is Heat Energy?**
   Ans. Heat is a form of Energy possessed by an object due to the vibration of the molecules.

2. **What are the units of Heat?**
   Ans. SI unit of Heat: Joule (J)
   CGS Unit of Heat: erg
   $1\ J = 10^7$ erg.
   - The relation between Joule and Calories is
     1 Cal=4.816 Joule

3. **What is Temperature?**
   Ans. Temperature is a quantity which tells the thermal state of a body (i.e., the degree of hotness or coldness of the body). It determines the direction of flow of heat when two bodies at different temperatures are placed in contact.

4. **Which instrument is used to measure temperature?**
   Ans. To measure temperature we use Thermometer.

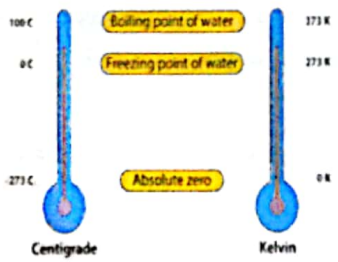
5. **What are the different scales are used in Thermometer to measure temperature?**
   Ans. There are three types of Scales are used in Thermometer to measure Temperature. They are
   a. Centigrade Scale
   b. Fahrenheat Scale
   c. Kelvin Scale

6. **Write the boiling Point and Melting Point of Water in Different Scales?**
   Ans.

Different Scales	Melting Point	Boiling Point
Centigrade Scale	0^0C	100^0C
Fahrenheat Scale	32^0C	212^0C
Kelvin Scale	273 K	373 K

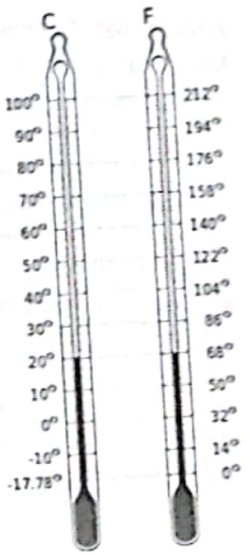
7. **What is absolute zero temperature?**
   Ans. The Zero of the Kelvin Scale is called Absolute Zero and it is at a temperature when molecular motion ceases.
   i.e 0 K=-273^0C

8. **What is the relation between Centigrade and Kelvin Scale?**
   Ans. We know the freezing point of water is-0^0C or 273 K
   And the boiling point of water is 100^0C or 373 K
   Thus, there are 100 equal division between Ice point and Boiling point both Celsius and Kelvin Scale.
   So, the temperature in Kelvin Scale =273+ Temperature in Celsius Scale.
   Or, **K=C+273**



9. **What is the relation between Centigrade and Fahrenheat Scale?**

Ans. We know the freezing point of water is- 0°C or 32°F
And the boiling point of water is – 100°C or 212°F
So, the 100 equal division of Celsius Scale = 180 equal division of Fahrenheat Scale.
or, 1° on Celsius Scale = $\frac{180}{100}$ on Fahrenheat Scale
or, 1° on Celsius Scale = $\frac{9}{5}$ on Fahrenheat Scale
So the length of each part in Celsius Scale is 1/100 and the length of each part of Fahrenheat scale is 1/180
Now the thermal expansion of mercury in Celsius Scale from freezing point of water (0°C) to C°C is
$\frac{C-0}{100}$ or $\frac{C}{100}$ ..... (I)
Now the thermal expansion of mercury in Fahrenheat Scale from freezing point of water (32°F) to F° is
$\frac{F-32}{180}$ ..... (II)
So from the equation (I) and equation (II) we get-
$\frac{C}{100}=\frac{F-32}{180}$
Or, $\frac{C}{5}=\frac{F-32}{9}$



10. **What happen when Heat is supplied to an object.**

Ans. When heat is supplied to an object, it can have one or more of the following effects:

a. It raises the temperature of object
b. It increases the size of the object
c. It changes the states of object.

11. **What amount of heat is required to raise temperature 10C of 1 kg water?**

Ans. To raise temperature 1°C of 1 kg water 4200 J heat is required.

12. **What amount of heat is required to raise temperature 1°C of 1 kg Aluminum?**

Ans. To raise temperature 1°C of 1 kg water 490 J heat is required.

13. **What is called Thermal Expansion?**

Ans. The expansion of a substance on heating is called the thermal expansion of that substance.

14. **What is Anomalous Expansion of Water?**

Ans. The expansion of water when it is cooled from 4°C to 0°C is known as Anomalous expansion of water.

15. **Which Liquids are used in thermometer to measure temperature?**

Ans. Mercury and Alcohols are used in liquid thermometer to measure temperature. Because their thermal expansion is uniform with respect to temperature.

16. **How can we open a lid of a bottle when it is tightly fixed with the bottle?**
Ans. We pour hot water on a bottle lid if it is too tight to open. This makes the lid expand slightly and it opens easily.

17. **Why in a railway track a small gap is left between two successive railway tracks.**
Ans. While laying a railway line a small gap is left between the two rails at the joints to allow expansion during summer. If such a gap is not left at the joints of two rails, the track will get deform due to thermal expansion in summer which may cause derailment of trains.

18. **Why in steel bridge one end id fixed and, in another end, roller is fixed.**
Ans. One end of the girders is fixed into the concrete or brick pillars and its other end is not fixed, but is placed on rollers. The reason is that if there are any rise (or fall) in temperature of the atmosphere, the girder can freely expand (or contract) without affecting the pillars.

19. **What is Melting or Fusion?**
Ans. The process in which solid substances changes into liquid on heating is called Melting.

20. **What is Melting Point?**
Ans. The melting point of a substance is the temperature at which it changes state from solid to liquid.
Ex: The melting point of Water is 0^0 C.

21. **What is Freezing or Solidification?**
Ans. Freezing means solidification. It is reversal of melting. The process in which liquid substance changes into solid is called Freezing.

22. **What is Freezing Point?**
Ans. The temperature at which temperature at which a liquid becomes a solid is called Freezing Point.
Ex: The freezing point of Water is 0^0 C.

23. **What is Vaporization or Evaporation?**
Ans. The process in which liquid substance changes into a gas rapidly on heating, is called boiling.

24. **What is Condensation or Liquefication?**
Ans. The process of changing gas to a liquid by cooling, is called Condensation.

25. **What is Boiling Point?**
Ans. The temperature at which temperature at which a liquid becomes vapor is called Boiling Point.

26. **What is Condensation Point?**
Ans. Condensation point is a temperature at which gas changes to liquid. Generally, boiling point is same as condensation point. For water boiling point is 100^0C. So, condensation point is also 100^0C

27. **What is Sublimation?**
Ans. The process of directly changing from the solid to gaseous state is called Sublimation.
Ex: Naphthalene, Dry ice etc.

28. **What is Deposition?**
Ans. Deposition is the reverse of process of sublimation. Here a gas solidifies directly without going through the liquid stage when it undergoes a reduction of temperature.

29. **What is Lateral Heat of Fusion?**
Ans. Ice kept at room temperature absorbs heat from the surroundings and melt. The heat is used for changing the state instead of rising the temperature is called Lateral Heat of Fusion of ice.
The melting point and the Lateral Heat of Fusion vary from substances to substances.

30. **What is Global Worming?**
Ans. **Global Warming** means gradual increase in world's temperature caused by greenhouse gases.
It is mainly because of the increased emotion of gases such as carbon dioxide and methane into the atmosphere due to human activity. These gases can prevent heat from escaping from the atmosphere.
The major effects pf global worming is rising the water level of sea due to melting of the ice at the poles.

31. **In how many ways heat can be transferred?**
Ans. Heat can be transferred in three different modes
a. Conduction
b. Convection
c. Radiation

32. **What is Conduction?**
Ans. Conduction is the process of transfer of heat from a hot part to a cold part of an object without the actual movement of molecules.
This mode of heat transfer takes place mainly in solids and to a lesser extent in liquids and gases.

33. **Why heat is transferred by Conduction process?**
Ans. Heat is transferred from one object to another by Conduction if
- The two objects are in contact
- They are at different temperature.

34. **What are Conductors?**
Ans. Materials that conduct heat well are called good conductors or Simply Conductors of heat.

35. **What are Insulators?**
Ans. Materials that don not conduct heat easily are called poor conductors or insulators of Heat.

36. **What is Convection?**
Ans. Convection is the process of transfer of heat in liquids and gases due to the actual movement of molecules within the substances.

37. **What is Convection Current?**
Ans. Liquids and gases expand in volume when heated. Hence, when a liquid or gas is heated, it becomes less dense and rises. Colder liquid or air descends to take the space vacated by the hotter material. This up and down movement is known as Convection Current.

38. **What is Radiation?**
Ans. Radiation is a process by which heat is transmitted from a hot object in straight lines, in all direction and at a very high speed without the need for a material medium.

39. **What is the speed of Heat through Air or Vacuum?**
Ans. 3×10^8 m/s

40. **The amount of heat radiated by an object is dependent on which factors?**
Ans. The amount of heat radiated by an object depends on the following factors:
    a. **Temperature:** A higher temperature results in greater radiation.
    b. **Colour:** Black or dark surfaces radiate more heat than white surfaces.
    c. **The nature of the surface:** Dull and rough surfaces radiate more heat than shiny and smooth surfaces.

41. **What are the uses of Radiators in Motor Vehicles?**
Ans. Radiators in motor vehicles pass heat from the engine to the atmosphere by radiation. They are often painted black to maximise radiation.

42. **What is Solar Cooker?**
Ans. A solar cooker is a device which uses the energy of direct sunlight to heat, cook or pasteurize drink and other food materials.

43. **What are the uses of Room Heater?**
Ans. Room Heaters keep rooms warm by radiating the heat produced by heating coils. They have a reflector with a shiny surface placed behind the coil to reflect heat to the front.

44. **Why do we wear light clothes in summer and dark clothes in winter**
Ans. We wear light clothes in summers because white and light clothes are bad conductors of heat and they reflect most of the heat energy fallen on them.
We wear dark or black colour of clothes in winter because they are good conductors of heat.

45. Write the differences between Conduction, Convection and Radiation?

Ans.

BASIS FOR COMPARISON	CONDUCTION	CONVECTION	RADIATION
Meaning	Conduction is a process in which transfer of heat takes place between objects by direct contact.	Convection refers to the form of heat transfer in which energy transition occurs within the fluid.	Radition alludes to the mechanism in which heat is transmitted without any physical contact between objects.
Represent	How heat travels between objects in direct contact.	How heat passes through fluids.	How heat flows through empty spaces.
Cause	Due to temperature difference.	Due to density difference.	Occurs from all objects, at temperature greater than 0 K.
Occurrence	Occurs in solids, through molecular collisions.	Occurs in fluids, by actual flow of matter.	Occurs at a distance and does not heats the intervening substance.
Transfer of heat	Uses heated solid substance.	Uses intermediate substance.	Uses electromagnetic waves.
Speed	Slow	Slow	Fast
Law of reflection and refraction	Does not follow	Does not follow	Follow

46. What is Thermos Flask?

Ans. Thermos Flask is a container which is designed to reduce heat transfer into and out of it to a minimum.

47. How Thermos flask works?

Ans. A thermos flask maintains the temperature of the substance kept in it, that is, it keeps a hot substance hot and cold substance cold for long a long time.

The outer casing of a thermos flask is made up of plastic or metal. Plastic, being a poor conductor of heat, acts as an insulator preventing the heat loss through conduction. Inside it, is a double-walled container made of glass or stainless steel. Both the walls are polished so they are shiny. The space between the two walls is a vacuum; this prevent prevents heat loss through convection since there are no air particles to carry out the transfer of heat. the shiny surface of the walls also prevents heat loss through radiation.