Heat

Heat is the form of energy. It is responsible for the change in thermal condition of the body. It may be defined as the energy flow due to a temperature difference.

Calorie

Amount of heat required to raise the temperature of 1 g of water by 1° C is called 1 calorie.

Or

Amount of heat required to raise the temperature of 1 g of water from 14.5° C to 15.5° C is called 1 cal. It is also called international calorie.

1 calorie = 4.285 joule

Temperature

Temperature is the measurement of hotness or coldness of a body.

Or

Temperature is the thermal condition of the body which also determines the direction of flow of heat.

Temperature Scales

Various scales are used for measuring the temperature. These are as follows:

1. **Centigrade Scale (°C)** In this scale, ice point and steam point are taken as 0°C and 100°C. 1°C is equal to 100th part of difference between two points.
2. **Fahrenheit Scale (°F)** In this scale, ice point and steam point are taken as 32°F and 212°F. 1°F is equal to the 180th part of difference between two points.
3. **Kelvin Scale (K)** In this scale, ice point and steam point are taken as 273 K and 373 K. 1 K is equal to the 100th part of difference between two points.
4. **Rankine Scale (Ra)** In this scale, ice point and steam point are taken as 460 Ra and 672 Ra. 1 Ra is equal to the 212th part of difference between two points.
5. **Reaumer Scale (R)** In this scale, ice point and steam point are taken as 0 R and 80 R. 1 R is equal to the 80th part of difference between two points.

Relation between Various Temperature Scales

$$\frac{C}{100} = \frac{F-32}{180} = \frac{R}{80} = \frac{K-273}{100} = \frac{Ra-460}{212}$$

Temperature	**Celsius** (°C)	**Fahrenheit** (°F)	**Kelvin** (K)
Freezing of water	0°C	32°F	273 K
Normal temperature of the room	27°C	80.6°F	300 K
Normal temperature of the human	37°C	98.6°F	310 K
Boiling point of the water	100°C	212°F	373 K

Thermometre

- The devices which measures the temperature of the body, is called thermometre.
- It was developed by Galileo.
- Thermometre has two fix points: upper fix point and lower fix points.
- Thermometers are following types:

(i) **Clinical thermometre** In this thermometre mercury (Hg) is used because of its greater visibility, higher density and do not stick on the wall of vessel.

It can measure temperature range between 96°F to 110°F.

It is used for measuring human body temperature.

(ii) **Liquid thermometre** Alcohol and mercury is used in this thermometre. Its lower fix point is – 30° C and upper fix point is 357°C.

(iii) **Pyrometre** It can measure the temperature range between – 40° to 3500° C. It is used for measuring sun temperature.

Principle of Calorimeter

Amount of heat loss = Amount of heat gain

Transmission of Heat

Transfer of heat from one place to other places is called transmission of heat. There are three processes by which transmission of heat takes place.

1. **Conduction** Conduction is that process of transmission of heat in which heat goes from one particle to another particle of substance, but not particle leaves its position. In solids, transmission of heat takes place by conduction process.

   e.g. during winter, iron seems colder and in summer it seems hotter than wood because iron is a good conductor of heat.
2. **Convection** Convection is that process of transmission of heat is which particles of substance go to another place after taking heat from the source, and other particles come to their place.

   In liquids and gases transmission of heat takes place by convection process.

   e.g. Formation of Sea Breeze.
3. **Radiation** Radiation is that process of transmission of heat in which medium is not required for transfer of heat. It is the quickest way of transmission of heat. Heat from the sun comes to the earth by radiation.
   e.g. in deserts, days are very hot, and nights are very cold. This is because of the very low specific heat of sand.

1. Which of the following statement(s) is/are not correct?

(a) Heat is a form of energy
(b) The unit of heat is ohm
(c) Heat flows from a higher temperature body to a lower temperature body
(d) All of the above

2. A marble tile would feel cold as compared to a wooden tile on a winter morning because the marble tile

(a) is a better conductor of heat than the wooden tile
(b) is polished while wooden tile is not polished
(c) reflects more heat than wooden tile
(d) is a poor conductor of heat than the wooden tile

3. When a ring of metal is heated what happens to its hole?
(a) Expands (b) Contracts
(c) It expands or contracts according to its diameter
(d) It expands or contracts according to is coefficient of expansion

4. Which of the following statement(s) is/are correct?
I. When one end of a metallic rod is heated its other end becomes hot
II. Heat is transmitted from lower temperature to higher temperature body.
(a) Only I
(b) Only II
(c) Both I and II
(d) Neither I nor II

5. On heating one end of iron rod, other end also gets heated. Such materials are called
(a) good conductor of heat
(b) good insulator of heat
(c) semiconductor of heat
(d) heater

6. The boiling point water is
(a) 100°C (b) 80°C
(c) 120°C (d) 200°C

7. The temperature of water at the bottom of a lake whose upper surface has frozen to ice would be around.
(a) – 10°C (b) °0C
(c) 4°C (d) – 4°C

8. When water changes to water vapour, then
(a) no temperature change takes place
(b) no heat flow occurs
(c) heat flows into the water from surrounding heat source
(d) Both (a) and (c)

9. Mercury thermometre was invented by
(a) Fahrenheit (b) Newton
(c) Priestley (d) Galileo

10. A metal X is used in clinical thermometre. It is the only metal which is in liquid state at room temperature. Metal X is
(a) silver (b) gold
(c) mercury (d) copper

11. Cooking is difficult on hills because
(a) atmospheric pressure is higher
(b) atmospheric pressure is lower
(c) boiling point of water is reduced
(d) Both (b) and (c)

12. Water pipes burst in severe winter at hill stations because
(a) they contract on cooling
(b) water in the pipe contracts on freezing
(c) water in the pipe expands on freezing
(d) pipes expand on cooling

13. Woollen clothes are warmer than the cotton ones because
(a) they are better absorbers of heat
(b) they are better insulators of heat
(c) they are better radiators of heat
(d) they are heavier than cotton clothes

14. A white and smooth surface is
(a) bad absorber and good reflector of heat
(b) good absorber and bad reflector of heat
(c) bad absorber and bad reflector of heat
(d) good absorber and good reflector of heat

15. The amount of heat that a body can absorb by radiation
(a) depends on colour and temperature both of body
(b) depends on colour of body only
(c) depends on temperature of body only
(d) depends on density of body

Answers

1	*(b)*	2	*(a)*	3	*(a)*	4	*(a)*	5	*(a)*	6	*(a)*	7	*(c)*	8	*(d)*	9	*(d)*	10	*(c)*
11	*(d)*	12	*(c)*	13	*(b)*	14	*(a)*	15	*(a)*										