

CHAPTER 4  
HEAT  
COMPETANCY BASED QUESTIONS

Question 1

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

Solution:

(a) A marble tile is a good conductor of heat as compared to the wood, therefore a marble tile will allow heat to pass through itself easily, keeping it cool on a winter morning.

Question 2

Shopkeepers selling ice blocks usually cover them with jute sacks. Explain why?

Solution:

A jute sack is a thermal insulator; therefore, it helps ice to remain solid for a longer time. So, shopkeepers must use insulating materials like sack, saw dust, newspaper etc, to cover the ice.

Question 3

A laboratory thermometers A is kept 7 cm away on the side of the flame while a similar thermometer B is kept 7 cm above the flame of a candle as shown in figure. Which of the thermometers A or B, will show a greater rise in temperature? Give reason.



**Fig. 4.5**

Solution:

Thermometer B whose bulb is just above the candle flame, will show a greater rise in temperature because hot air above the candle rises up immediately due to convection of heat and increases the temperature of bulb of thermometers higher than that of A.

Question 4

To keep her soup warm, Paheli wrapped the container, in which it was kept a woollen cloth. Can she apply the same method to keep a glass of cold drink cool? Give reason for your answer.

Solution:

Yes, she can apply the same method to keep a glass of cold drink cool because wool is a thermal insulator, and it cannot allow heat to pass through it.

Question. 5

In a mercury thermometer, the level of mercury rises when its bulb comes in contact with a hot object. What is the reason for this rise in the level of mercury?

Solution:

As the temperature increases, expansion of mercury takes place in the capillary tube which leads to the rise in the level of mercury in thermometer.

Question 6

Why do we wear light coloured clothes in summer?

Solution:

The light coloured clothes reflect the heat back into the environment and keep us cool during the summer time.

Question 7

Why do we wear dark coloured clothes in winter?

Solution:

The dark colour clothes absorb the heat from the environment and keep us warm.

### Question 8

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

Solution:

More layers of clothing during winter keeps us warmer than wearing just one thick piece of clothing because air gets trapped in-between layers. As air is a bad conductor of heat it does not allow the escape of heat from the body.

### Question 9

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

Solution:

In places of hot climate, it is advised that the outer walls of houses be painted white because white colour reflects back most of the heat radiations that incident on it. This helps in keeping the house cool.

### Question 10

How is temperature different from thermal energy?

Solution:

Thermal energy is the sum of energy possessed by all the moving molecules of the substance, while temperature tells how hot or cold a substance is. It is the measure of how fast or slow the molecules are moving.

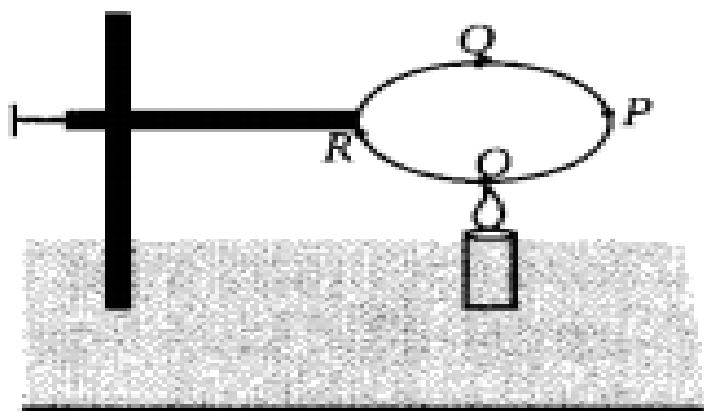
Temperature indicates the level of thermal energy but it does not tell how much energy is present in the substance.

### Question 10

A circular metal loop is heated at point O as shown in figure.

(a) In which direction, would heat flow in the loop?

(b) In which order, the pins at points P, Q and R fixed with the help of wax fall if points O, P, Q and R are equidistant from each other.



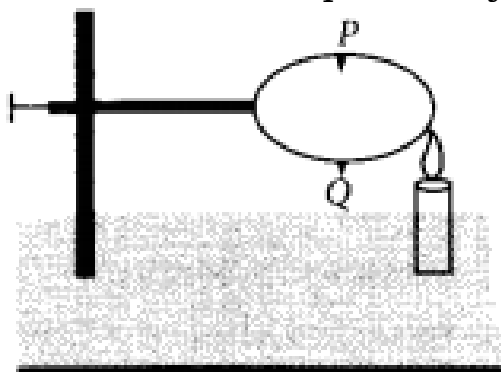
Solution:

(a) Heat will flow in both the directions i.e. from O to P and O to R.

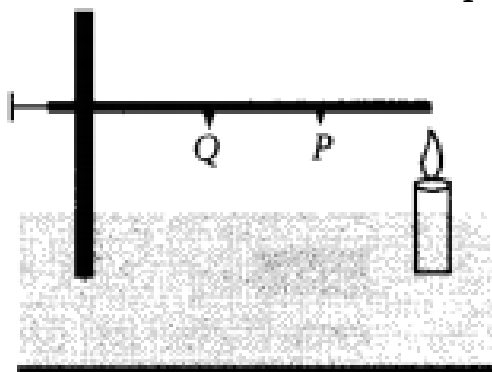
(b) First of all pins at P and R will fall simultaneously and after that pin at Q will fall because equal amount of heat will reach the pins at P and R first.

Question 11

In the arrangements A and B as shown in figure, pins P and Q are fixed to a metal loop and an iron rod with the help of wax. In arrangement A, point P and point Q are equidistant from the point of heating. In which case are both the pins likely to fall at different times? Explain.



(A)



(B)

Solution:

As from the given figures A and B, in case of A, pins at P and Q get equal amount of heat, so pins fixed at P and Q in case of A will fall simultaneously.

But in case of B pin at point P falls before the pin at Q as because heat will reach the pin at P first than the pin at Q.

#### Question 12

For setting curd, a small amount of curd is added to warm milk. The microbes present in the curd help in setting if the temperature of the mixture remains approximately between 35°C to 40°C. At places where room temperature remains much below the range, setting of curd becomes difficult. Suggest a way to set curd in such a situation.

Solution:

For the setting of curd at places where temperature is below room temperature, the container in which curd is to be made, must be kept in a thermally insulated cover or it can be wrapped either by a woollen material or a jute sack so that temperature is maintained for the setting of curd. The container can also be kept in the sun or near the gas stove while cooking food for the setting of curd.

#### Question 13

You may have noticed that a few sharp jerks are given to clinical thermometer before using it. Why is it done so?

Solution:

Jerks are given to clinical thermometer before using it to settle down the mercury level below normal temperature, so that the measurement of temperature of a body can be taken accurately.

#### Question 14

It is advised not to hold the thermometer by its bulb while reading it. Explain, why?

Solution:

We are advised not to hold the thermometer bulb while reading it, as the level of mercury varies from the actual reading due to our body temperature.

#### Question 15

At a camp site there are tents of two shades. One made with black fabric and the other with white fabric. Which one will you prefer for resting on a hot summer afternoon? Give reason for your choice. Would you like to prefer the same tent during winter?

Solution:

We will prefer a white fabric tent in case of summer because it reflects all the radiations from the sun and keeps us cool inside the tent.

No, in case of winter, we should use a black fabric tent as it absorbs all colours of light from the sun and keeps us warm inside the tent.

Question 15

While constructing a house in a coastal area, in which direction should, the windows preferably face (towards the sea or not towards the sea). Why?

Solution:

Windows should preferably face towards the sea because the sea breeze coming from sea keeps the house cool during the day time.

Question 16

Observe the picture given in figure. Water is being boiled in a pan of wide base.

(a) Which position P or T will feel warmer?

(b) Fill up the boxes P and T to indicate the mode of flow of heat to the hand.

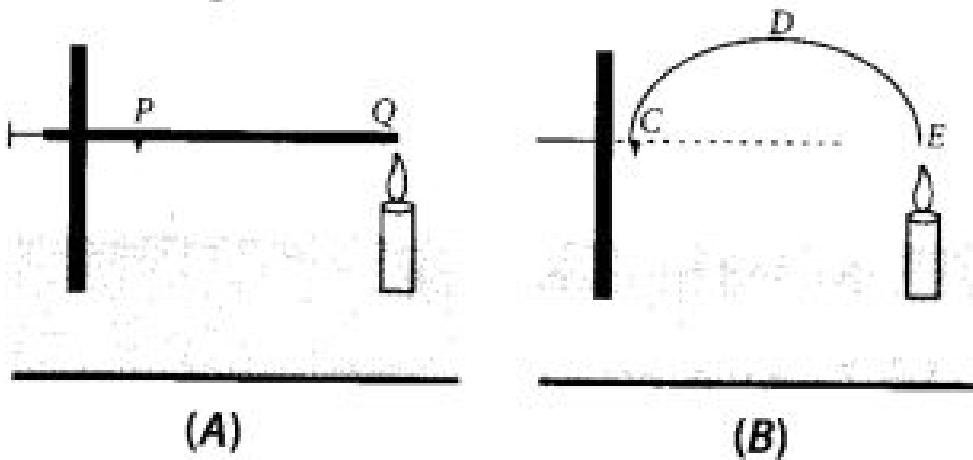


Solution:

(a) From the given diagram, position P will feel warmer because of hot air rising up.

(b) The flow of heat to P is a convection process because the air near the boiling water gets hot and rises. However, on the sides such as at T, there is no convection and air does not feel as hot as at the top. Therefore, flow of heat to T is a radiation process.

Question 17



The length of wire PQ in case of A is equal to the diameter of the semicircle formed by the wire CDE, in case B. One pin is attached to each wire with the help of wax as shown in figure. Which pin will fall first? Explain.

Solution:

The pin on the wire P Q in case A will fall first because the heat will reach to the pin on straight wire P Q before the heat reaches the pin on the semicircular wire C D E in case B.

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