



# UNIT

# 9

## TRANSFER OF HEAT

### TEXTBOOK EXERCISE QUESTIONS

- 9.1 Encircle the correct answer from the given choices.
- In solids, heat is transferred by: (LHR 2015)
    - Radiation
    - conduction
    - convection
    - absorption
  - What happens to the thermal conductivity of a wall if its thickness is doubled? (GRW 2015)
    - Becomes double
    - remains the same
    - Becomes half
    - becomes one forth
  - Metals are good conductor of heat due to the:
    - Free electrons
    - big size of their molecules
    - small size of their molecules
    - rapid vibration of their atoms
  - In gases, heat is mainly transferred by: (LHR 2015)
    - Molecular collision
    - conduction
    - convection
    - radiation
  - Convection of heat is the process of heat transfer due to the \_\_\_\_\_ of the molecules:
    - Random motion
    - downward movement
    - upward movement
    - free movement
  - False ceiling is done to: (LHR 2016)
    - Lower the height of ceiling
    - keep the roof clean
    - cool the room
    - insulate the ceiling
  - Rooms are heated using gas heaters by: (GRW 2016)
    - Conduction only
    - convection and radiation
    - Radiation only
    - convection only
  - Land breeze blows from: (LHR 2016)
    - Sea to land during night
    - sea to land during the day
    - Land to sea during night
    - land to sea during the day
  - Which of the following is a good radiator of heat?
    - A shining silvered surface
    - A dull black surface
    - A white surface
    - A green colored surface
  - Styrofoam is a:
    - Conductor
    - Semiconductor
    - Bad conductor
    - None of them
  - Unit of thermal conductivity is:
    - $\text{W m}^{-1} \text{K}^{-1}$
    - $\text{W m}^{-1} \text{K}^{-2}$
    - $\text{W m}^{-2} \text{K}^{-1}$
    - $\text{W m}^2 \text{K}^{-1}$
- 9.2 Why metals are good conductors of electricity? (GRW2013, 2014, 2016)



**Ans:** Metals have free electrons. These free electrons move with very high velocities within the metal objects. They carry energy at a very fast rate from hot to cold parts of the objects as they move, that is why metal are good conductors of heat.

### 9.3 Explain why?

#### (a) A metal feels colder to touch than wood kept in a cold place?

Conductors have good conduction property. So by touching cold conductors, there is a rapid transfer of heat from our hand to cold conductor and it feels colder. As wood is a bad conductor, so transfer of heat from our hand to wood is very low. Due to this reason, we feel less cold.

#### (b) Land breeze blows from land towards sea?

At night, the land cools faster than the sea. Therefore, air above the sea is warmer, rises up and the cold air from the land begins to move towards the sea.

#### (c) Double walled glass vessel is used in thermos flask?

A double walled glass is used to prevent the flow of heat due to conduction and convection through the vacuum between double walls of vessel.

#### (d) Desserts soon get hot during the day and soon get cold after sunset.

As the specific heat of sand is low, so it absorbs the heat more quickly and gets hot in day. In night, it releases heat more quickly and become cold quickly after sunset.

### 9.4 Why conduction of heat does not take place in gases? (GRW 2015)

**Ans:** Gases are poor conductor of heat because gases do not have free electrons. Further more for conduction molecules should be close while in gases molecules have vast spaces. That why gases do not undergo conduction.

### 9.5 What measures do you suggest to conserve energy in house? (LHR 2016)

**Ans:** To conserve energy in our house, following measure may be taken:

- Hot water tanks are insulated by plastic or foam lagging
- Wall cavities are filled with plastic foam or wool
- Ceiling of room is covered by insulating materials (false ceiling)
- Double glazed window panes are used, these windows panes have air between glass sheets that provides good insulation

### 9.6 Why transfer of heat in fluids takes place by convection? (GRW 2015)

**Ans:** Liquids and gases are poor conductors of heat due to large distances among their molecules. However, heat is transferred through fluids (liquids or gases) by a method called convection. Heat transfer of heat in fluids takes place by convection because movement of molecules is easy in fluids.

### 9.7 What is meant by convection current? (LHR 2013, GRW 2014, 2015)

**Ans:** Gases also expand on heating, thus convection currents are easily set up due to the differences in the densities of air at various parts in the atmosphere.

### Example

Convection currents set up by electric, gas or coal heaters help to warm our homes and offices.

### 9.8 Suggest a simple activity to show convection of heat in gases not given in the book.

**Ans:** In summer, the intense radiations of sun warm the surface of Earth. The air near the surface is also heated and expands. Its density decreases due to increase of volume and it rises up. A colder air comes to fill this gap, due to which conventional currents of air are produced.

**9.9 How does heat reach us from the sun?**

**Ans:** Heat reaches us neither by conduction nor by convection, because the space between the Sun and Earth's atmosphere is empty. Heat reaches us through a mode called radiations (light waves) from the sun.

**9.10 How various surfaces can be compared by Leslie cube?**

**Ans:** Different sides of Leslie cube are made different in nature. So transfer of heat from different sides of the cube is different. So, various surfaces can be compared by Leslie cube. A leslie cube is a metal box having faces as follows:

- A shining silved surface
- A dull black surface
- A White surface
- A coloured surface

**9.11 What is greenhouse effect?**

(LHR 2015, GRW 2016)

**Ans:** Glass and transparent polythene sheets allow radiations of short wavelength to pass through easily but not long wavelengths (infrared) of thermal radiations. Thus, greenhouse becomes a heat trap. Radiations from the sun pass easily through glass and warms up the objects in a greenhouse.

**9.12 Explain the impact of green-house effect in global warming.**

**Ans:** Earth's atmosphere contains carbon dioxide and water vapours. It causes greenhouse effect and thus maintains the temperature of the Earth. During the recent years, the percentage of carbon dioxide has been increased considerably. This has caused an increase in the average temperature of the Earth by trapping more heat due to greenhouse effect. This Phenomenon is known as global warming.

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