

# Chapter 6

## Heat Transfer

### LESSON PLAN

#### SPECIFIC OBJECTIVES

Students will learn about

- ❖ introduction to heat and temperature
- ❖ vaporisation – boiling and evaporation
- ❖ differences between evaporation and boiling
- ❖ thermal expansion
- ❖ thermal expansion in solids, liquids and gases

#### Teaching Aids

Pictures/models showing boiling and evaporation, thermal expansion in solids, liquids and gases; pictures showing applications of thermal expansion; few formulae related to coefficient of linear, area and volume expansion used to solve the numerical problems.

#### Teaching Strategy

- ❖ Students should be asked to study the concept of heat and temperature.
- ❖ Students should be asked to study vaporisation–boiling and evaporation. They should be encouraged to study differences between evaporation and boiling. They should also be asked to study thermal expansion; thermal expansion in solids using activity 1 given at page 101.
- ❖ The teacher should ask the students to perform activity 2 demonstrating thermal expansion of solids using Gravesand’s ring and ball experiment given at page 101. He/She should ask the students to study different solids expand differently. He/She also asked the students to perform activity 3 showing that equal lengths of different solids expand differently given at pages 101–102.
- ❖ Students should be suggested to learn thermal expansion of solids based on molecular motion.
- ❖ The teacher should ask the students to solve check point 1 given at page 102. He/She should also ask the students to learn three kinds of thermal expansion in solids, i.e., linear, area and volume expansions; formula, SI unit and illustration of coefficient of linear, area and volume expansion. He/She should ask the students to learn Table 6.1 showing the values

of coefficient of linear expansion ( $\alpha$ ) of some common solids or materials given at page 103. He/She should also ask the students to learn Table 6.2 showing values of coefficient of volume expansion ( $\gamma$ ) of some solids or materials given at page 104.

- ❖ Students should be asked to practice few numerical problems related to thermal expansion in solids. They should also be asked to solve check point 2 given at page 105.
- ❖ The teacher should ask the students to study thermal expansion in liquids and its related activity 4 given at page 105. He/She should ask the students to study different liquids expand differently using activity 5 given at page 106. He/She also should ask the students to learn something more related to water behaving as anomalous expansion given at page 106.
- ❖ Students should be asked to learn Table 6.3 showing values of volume expansion coefficients ( $\gamma$ ) of certain liquids. They should also be asked to study thermal expansion in gases using activity 6 given at page 107.
- ❖ The teacher should ask the students to study applications of thermal expansion, and something more related to high-quality measuring tapes. He/She should also ask the students to solve check point 3 given at page 108.
- ❖ Students should be asked to recap the whole chapter using wrapping it up and know these terms. They should also be asked to answer the questions given in test yourself and discuss the think zone given in it.

### Boost UP

- ❖ The teacher should divide the students present in the classroom into two groups A and B. He/She should call one student each of groups A and B and tell him/her to define heat and temperature.
- ❖ Students should be asked to define boiling, boiling point and evaporation, and also to tell which process occurs at all temperatures.
- ❖ Students should be asked to tell in which state of matter substance expands more on heating. They should also be asked to tell the difference between coefficient of linear expansion, area expansion and volume expansion, and also to tell their related formulae and relationship between them.
- ❖ The teacher should ask the students to tell few applications of thermal expansion.

### Expected Learning Outcomes

Students will be able to know the

- ❖ brief history of heat and temperature.
- ❖ vaporisation–boiling and evaporation.
- ❖ differences between evaporation and boiling.
- ❖ thermal expansion.
- ❖ thermal expansion in solids.
- ❖ kinds of thermal expansion in solids.
- ❖ thermal expansion in liquids.
- ❖ thermal expansion in gases.
- ❖ applications of thermal expansion.

## Evaluative Questions

The teacher should ask the following questions to evaluate the students.

1. Define heat.
2. Which is the measure of degree of hotness and coldness of a body?
3. What is boiling point?
4. What does thermal expansion mean?
5. What is meant by linear expansion?
6. Establish the relation between coefficient of linear expansion and coefficient of area expansion.
7. Which expansion is only possible in liquids?
8. Write one application of thermal expansion.