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## UNIT 6 STAIRCASES AND CEILINGS

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### Structure

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### 6.1 INTRODUCTION

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It is a space or enclosure where steps are arranged systematically to travel from one floor (height) to another conveniently. Stairs may be constructed of timber, reinforced brick masonry, stone, steel or reinforced cement concrete. Here stairs, constructed of reinforced concrete, have only been dealt with.

A ceiling is the bottom surface or soffit of a floor or roof. However, in this unit the ceiling means false ceiling which is hung from the floor or roof ceiling with air-gap in between. The air-gap may sometimes be partially or fully filled with quilt, glass wool, etc. for sound or heat insulation. The false ceiling is hung from wooden steel or aluminium frame.

#### Objectives

After studying this unit, you should be able to

- discuss the architectural aspects of staircases,
- explain the type of RCC staircases, and
- describe different types of false ceiling.

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### 6.2 ARCHITECTURAL ASPECTS

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Staircases must be convenient for users and economical. To fulfill the above criteria the following considerations are to be kept in mind.

#### Width of Steps

The width of steps is fixed as per traffic requirements. However, it is not less than 0.9 m so that users crossing each other may not collide.

#### Tread and Rise

Tread and rise ratio of steps shall be such that the users may walk up and down with ease (Figure 6.1). Following dimensional relations and provisions comply with the above mentioned contentions:

- (a) Rise = 125 to 200      Tread = 225 to 320
- (b) Rise Tread            = 4300
- (c)  $2 \times \text{Rise} + \text{Tread} = 590$
- (d) Total number of steps in one flight shall neither be less than 3 nor more than 15.
- (e) Steps in one flight must have the same tread and rise.

**Landing**

Width of a landing shall not be less than the width of steps. Length of a landing depends upon requirement and space available not less than its width.

**Head Room**

Head room shall be such that user may carry useful furniture, luggage, etc. without any inconvenience. A minimum of 2.1 m head room is essential (Figure 6.1).

Figure 6.1 : Profile of a Stair

Figure 6.2 : Straight Stairs

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### 6.3 TYPES OF STAIRCASE

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Many types of staircases are in use including ornamental ones. Here commonly used staircases only have been described through Figures 6.2 to 6.6. A sectional view of reinforced concrete flight (Figure 6.7) has also been drawn.



**Figure 6.3 : Dog-legged or Half-turn Stairs**



**Figure 6.4 : Open Well Stairs**



**Figure 6.5 : Quarter-turn Stairs**



**Figure 6.6 : Bifurcated Stairs**

**Figure 6.7 : Sectional View of a Typical Reinforced Concrete Stair**

**SAQ 1**



- (a) Discuss architectural aspects of a staircase.
- (b) Sketch a bifurcated staircase.

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## **6.4 TYPES OF FALSE CEILING**

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False ceiling may be of three types :

- (a) Wooden frame ceiling
- (b) Steel frame ceiling
- (c) Aluminium frame ceiling

### **Wooden Frame Ceiling**

A typical wooden frame ceiling has been described through Figure 6.8. The frame is made of wooden joists grid and hung from the ceiling with suspenders.

**Figure 6.8 : Glass Wool Quilt for Insulation Purpose**

### **Steel/Aluminium Frame Ceiling**

A typical steel/aluminium frame ceiling is shown in Figure 6.9. A frame made of perforated light weight steel or aluminium sections is made and hung from the ceiling of floor or roof with suspenders. False ceiling is made of plastered boards, cork board, straw board, plaster of Paris on chequered mesh, etc.

**Figure 6.9 : Wooden Frame Ceiling**

**Figure 6.10 : Steel/Aluminium Frame Ceiling**

### **SAQ 2**



- (a) Define a false ceiling.
- (b) Sketch wooden false ceiling.

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## 6.5 SUMMARY

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In this unit, we have studied the different types of stair alongwith their architectural aspects.

A false ceiling is provided for insulating against fire, heat and sound and to obtain plane surface for ceiling. There are generally three types of false ceilings. These are as follows :

- (a) Wooden frame ceiling,
- (b) Steel frame ceiling, and
- (c) Aluminium frame ceiling.

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## 6.6 ANSWERS TO SAQs

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### SAQ 1

- (a) Refer to Section 6.2.
- (b) Refer to Section 6.3.

### SAQ 2

- (a) Refer to Section 6.4.
- (b) Refer to Section 6.4.