

**UNIT 1  
INTRODUCTION  
UNIT I**

**Objective of structural design-Steps in RCC Structural Design Process- Type of Loads on Structures and Load combinations- Code of practices and Specifications - Concept of Working Stress Method, Ultimate Load Design and Limit State Design Methods for RCC –Properties of Concrete and Reinforcing Steel - Analysis and Design of Singly reinforced Rectangular beams by working stress method - Limit State philosophy as detailed in IS code - Advantages of Limit State Method over other methods - Analysis and design of singly and doubly reinforced rectangular beams by Limit State Method.**

### **1.1 Objective of Structural Design**

The objectives of structural design are to design the structure for stability, strength and serviceability. It must also be economical and aesthetic.

**The design of a structure must satisfy three basic requirements:**

- 1) Stability** to prevent overturning, sliding or buckling of the structure, or parts of it, under the action of loads,
- 2) Strength** to resist safely the stresses induced by the loads in the various structural members; and
- 3) Serviceability** to ensure satisfactory performance under service load conditions - which implies providing adequate stiffness and reinforcements to contain deflections, crack-widths and vibrations within acceptable limits, and also providing impermeability and durability (including corrosion-resistance), etc.

There are two other considerations that a sensible designer ought to bear in mind, viz., **economy and aesthetics**. One can always design a massive structure, which has more-than-adequate stability, strength and serviceability, but the ensuing cost of the structure may be exorbitant, and the end product, far from aesthetic. In the words of Felix Candela, the designer of a remarkably wide range of reinforced concrete shell structures, It is indeed a challenge, and a responsibility, for the structural designer to design a structure that is not only appropriate for the architecture, but also strikes the right balance between safety and economy.