Glossary

Limit states

Limit states are the acceptable limits for the safety and serviceability requirements of the structure before failure occurs. There are two main limit states: (i) limit state of collapse and (ii) limit state of serviceability.

Limit state of collapse

Limit state of collapse deals with the strength and stability of structures subjected to the maximum design loads out of the possible combinations of several types of loads. Therefore, this limit state ensures that neither any part nor the whole structure should collapse or become unstable under any combination of expected overloads.

Limit state of serviceability

Limit state of serviceability deals with deflection and cracking of structures under service loads, durability under working environment during their anticipated exposure conditions during service, stability of structures as a whole, fire resistance etc.

Balanced section

The reinforced concrete section in bending is assumed to fail when the compression strain in concrete reaches the failure strain in bending compression equal to 0.0035. Reinforced concrete beam sections in which the tension steel also reaches yield strain simultaneously as the concrete reaches the failure strain in bending are called balanced sections.

Under reinforced section: Reinforced concrete beam sections in which the steel reaches yield strain at loads lower than the load at which the concrete reaches failure strain are called under-reinforced sections.

Over reinforced section

Reinforced concrete beam sections, in which the failure strain in concrete is reached earlier than the yield strain of steel is reached, are called over-reinforced sections.

Nature of failure in under reinforced section and over reinforced section

Under reinforced section – tension or ductile failure

Over reinforced section – compression or brittle failure