

SHIV NADAR UNIVERSITY
U.G. / P.G. COURSE DESCRIPTION

- I. **Course Title:** Design of Steel Structures
- II. **Course Code:** CED401
- III. **Course Credits (L:T:P):** (3:0:0)
- IV. **Course Type:** Major
- V. **Prerequisite/s (If Any):** CED201, CED 204, CED301
- VI. **Course Coordinators/Instructor(s):** Dr. Ghanshyam Pal
- VII. **School:** School of Engineering
- VIII. **Department:** Civil Engineering
- IX. **Objective:** For centuries, low-carbon structural steel has been used as the primary construction material for residential and commercial buildings, bridges, towers, stadiums, etc. In general, hot rolled sections of various shapes (I-section, channels, angles, hollow sections, etc.) are used to fabricate primary and secondary loading bearing members, such as ties, struts, beams, columns, etc., in these structures. The main objective of this Course is to introduce students to the design these steel structural members by applying the concepts of limit state method through the guidelines provided in Indian standard IS800 – 2007. The design of bolted and welded connections used in these steel structures is also discussed as a part of this course.
- X. **Learning Outcomes:** Upon successful completion of the course, students are able to:
- Understand and differentiate between the limit state of strength and limit state of serviceability for steel structures.
 - Understand and apply the concepts of limit state design towards the designing of steel structures.
 - Understand and apply the concepts of plastic design for flexural load bearing structural steel members.
 - Understand and apply the guidelines provided in IS800 – 2007, IS808 – 1989 and SP6 – Part 1 for designing of various structural steel members.
 - Design the bolted and welded connections used in the fabrication of steel structures.
- XI. **Course Content:**
- Module 1: Introduction**
- Properties of Structural Steel; Difference between the properties of hot-rolled and cold-rolled structural sections; Introduction to limit state design method.
- Module 2: Design of Steel Connections**

Type of connections; Basic applications of bolted and welded connections; Strength, efficiency and design of bolted joints; Advantages and disadvantages of welded connections, Design of fillet and butt welds, Design of eccentric connections.

Module 3: Tension Members

Concept of gross and net sectional area; Permissible stresses; Design of axially loaded tension member, Design of member subjected to axial tension and bending.

Module 4: Compression Members

Modes of failure of a column; Euler's Theory of elastic buckling; Effective length and slenderness ratio; Design of compression members; Design of built-up compression members.

Module 5: Plastic analysis of structure

Basics of plastic analysis; Concept of plastic hinge; Shape factor, Elastic and plastic section modulus; Calculation of collapse load.

Module 6: Beams

Design of flexural members with and without lateral support; Web Crippling, Web Buckling; Built-up beams, Plate girders.

XII. Recommended Books:

- [1] N. Subramanian, Design of steel structures.
- [2] S. K. Duggal, Limit state design of steel structures.
- [3] NPTEL notes on "Design of steel structures" available on <https://nptel.ac.in/courses/105105162/>

XIII. Assessment Scheme #, *, **:

- [1] Assignment: 15 %
 - [2] Quiz: 15 %
 - [3] Mid Semester Exam: 20 %
 - [4] Class participation: 10%
 - [5] Final Exam: 40 %
- # The above marking scheme is based on an absolute scale.
- * Minimum marks required to pass the course (on absolute scale): 50%
- ** Final grades will be assessed based on the relative (percentile) basis.