

# STEEL STRUCTURES DESIGN AND DRAWING

## VI Semester: CE

Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACEC23	Core	L	T	P	C	CIA	SEE	Total
		3	1	0	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil				Total Classes: 60		

**Prerequisite:** Analysis of Structures

## I. COURSE OVERVIEW:

Steel structures design and drawing deals with the analysis and design of steel structural elements like tension members, compression members, beams and girders etc. This course will focus on mechanical properties of structural steel, concepts of elasticity and plasticity and limit state design. The course will help to enrich the knowledge of design in multi storeyed and industrial structures including bridges. The course will also enhance the knowledge or skill sets of the student for designing efficient, economic and durable steel structures.

## II. COURSE OBJECTIVES:

**The student will try to learn:**

- I. The concepts of limit state design and the behavior of structural steel used in design and its properties.
- II. The design of structural elements necessary for creating efficient and economic steel structures.
- III. The design and drawing of multi storeyed industrial and residential structures including bridges for creating high performance and durable structures.

### III. COURSE OUTCOMES:

**After successful completion of the course, students should be able to:**

- |      |   |            |
|------|---|------------|
| CO 1 | <b>Recall</b> the concepts of structural steel properties, different loads and their combinations for understanding the behavior of steel structures.   | Remember   |
| CO 2 | <b>Explain</b> the concept of limit state design, different limit states, design strengths, deflection limits and serviceability requirements for the designing of steel structural elements. | Understand |
| CO 3 | <b>Design</b> bolted and welded connections for joining two or more steel structural elements for the transfer of loads.  | Apply      |
| CO 4 | <b>Design</b> tension members, compression member / column, beams and girders using Indian standard code method.  | Apply      |
| CO 5 | <b>Design</b> eccentric connections with brackets, beam end connections, web angle and truss joints for large crane movement in industries.   | Apply      |
| CO 6 | <b>Design</b> of plate girders with and without stiffeners for designing bridge structures and large span beams.  | Apply      |

#### IV. COURSE SYLLABUS:

**MODULE –I: INTRODUCTION ON MECHANICAL BEHAVIOUR OF STEEL (9)**

Materials, making of iron and steel, types of structural steel, mechanical properties of steel, concepts of plasticity yield strength, loads and combinations, behavior of steel, local buckling. Concept of limit state design – different limit states as per IS 800:2007. Design strengths deflection limits, serviceability, bolted connections, efficiency of joint, prying action, design of tension members, design strength of members.

## MODULE -II: COMPRESSION MEMBERS (9)

Design of compression members, buckling class, slenderness ratio, strength design, laced columns, battened columns, slab base.

### MODULE -III: BEAMS (9)

### Design of beams and bending and shear strength laterally supported beams.

Design of built-up sections, large plates web buckling, crippling and deflection of beams, design of purlin.

**MODULE -IV: ECCENTRIC CONNECTIONS (9)**

Design of eccentric connections with brackets, beam end connections, web angles, design of truss joints.

**MODULE -V: PLATE GIRDERS (9)**

Design of plate girders, optimum depth, design of main section, design of end bearing stiffness and intermediate stiffness. Connection between web and flange.

**V. TEXT BOOKS:**

1. S. K. Duggal, "Limit state design of steel structures", Tata McGraw-Hill, 3<sup>rd</sup> Edition, 2019.
2. N. Subramanian, "Design of steel structures", Oxford University Press, 2<sup>nd</sup> Edition, 2018.
3. S.S. Bhavikatti, "Design of steel structures", 4<sup>th</sup> Edition, IK International Publication House, New Delhi, 2014.

**VI. REFERENCE BOOKS:**

1. K. S. Sai Ram, "Design of Steel Structures", Pearson Education, 2<sup>nd</sup> Edition, 2015.
2. Dr. Ramachandra and Virendra Gehlot, "Design of Steel Structures Volumes 1 and 2", Standard Publications, 2<sup>nd</sup> Edition, 2010.
3. Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer, "Design of Steel Structures", Tata McGraw-Hill Education Private Limited, 3<sup>rd</sup> Edition, 2010.

**VII. WEB REFERENCES:**

1. <https://nptel.ac.in/courses/105/105/105105162/>
2. <https://programs.online/swayam/design-of-steel-structures>.

**VIII. E-TEXT BOOKS:**

1. [https://books.google.co.in/books?id=TFtIpR7XJBAC&printsec=frontcover&source=gbs\\_ge\\_summary\\_r&cad=0#v=onepage&q&f=false](https://books.google.co.in/books?id=TFtIpR7XJBAC&printsec=frontcover&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false).