

**B.E. Semester: VII**  
**Department of Civil Engineering**

**Subject Name: Design of Steel Structures (CV701-N)**

**Course Category: Program Course Core (PCC)**

**A. Objectives of the Course:**

- The main objective of the course is to provide coherent development to the students in sector of designing of the steel structures.
- To let the students know the theory and application of RCC, hence by difference, they could easily identify the difference between two main material of structural engineering
- To present the foundations of many basic engineering concepts related design of steel structures.
- To give an experience in the implementation of engineering concepts those are applied in field of Steel Structures.
- To involve the application of scientific and technological principles of planning, analysis, design of steel buildings.
- To increase students interest and application vision

**B. Teaching & Evaluation Scheme:**

Teaching Scheme				Credit	Evaluation Scheme					Total Marks
L	T	P	Total		Theory		IE	CIA	Pra/Viva	
hrs	hrs	hrs	Hrs		Hrs	Marks	Marks	Marks	Marks	
3	2	0	5	5	3	70	30	20	30	150

**C. Detailed Syllabus:**

**1. Introduction to Steel as a Structural Material:**

*General Introduction* – Engineering Properties of Steel Material, Application of Steel in Structural Design Field, Pros and Cons of Steel over RCC in general

*Design Methodology of Steel Structure* – Limit State Concept of Steel Structure, Difference in Limit State Concept between RCC and Steel, Design Process for Steel Structure in General

**2. Design of Members Subjected to Axial Force:**

*Design of tension members* – Behaviour of Tension Members, Mode of Failures, Factors Affecting the Strength of Tension Members, Design and Checking of the Member as per IS 800: 2007

*Design of compression members* – Behaviour of Compression Members, Mode of Failures, Factors Affecting the Strength of Compression members, Design and checking of the member as per IS 800: 2007, Lacing, Battening

**3. Design of Flexural Members:**

Behaviour of flexural members, mode of failures, factors affecting the strength of flexural members, design and checking of the simply supported prismatic members as per IS 800: 2007 for laterally restrained and laterally unrestrained beams subjected to bending only, Design of Gantry Girder

**4. Design of Connections:**

*Design of bolted connections* – Types of bolts, bolt tightening methods, advantages and disadvantages, behaviour of bolted connections, mode of failures, design of bolted connections as per IS 800: 2007 for axial force resisting, moment resisting and shear resisting connections

*Design of welded connections* – Advantages and Disadvantages, Behaviour of Welded Connections, Mode of Failures, Design of Welded Connections as per IS 800: 2007 for Axial Force Resisting, Moment Resisting and Shear Resisting Connections

**5. Introduction to Special Steel Structures:**

Uses, Components, Indian Standards and Forces to be considered for Plate Girder, Foot Over Bridge, Pipe Rack, Transmission Tower, Chimney, Silo

**NOTE: All Designs will be according to Limit State Method as per IS 800: 2007**

#### **D. Lesson Planning:**

<b>Unit No</b>	<b>Title of the Unit</b>	<b>Minimum Hours</b>	<b>Weightage (%)</b>
1	Introduction to Steel as a Structural Material	02	05
2	Design of Members Subjected to Axial Forces	15	30
3	Design of Flexural Members	11	25
4	Design of Connections	15	30
5	Introduction to Special Steel Structures	02	10
Total		45	100

#### **E. Assignments:**

- 15 Examples from each topic
- Analysis, Design and Detailing of one Industrial Truss Manually for Gravity Loads
- Analysis, Design and Detailing of Steel Frame Structure Manually for Gravity Loads

#### **F. Instructional Method and Pedagogy (Continuous Internal Assessment Scheme CIA):**

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lecture may be conducted with the aid of multi-media projector, black board, OHP etc.
- Videos of steel structure construction will be shown before teaching analysis and design of an element
- Attendance is compulsory in lectures, practical and Tutorial which carries 05 Marks.
- At regular intervals assignments is given. In all, a student should submit all assignments of 05 marks each.

- Classroom participation and involvement in solving the problems in Tutorial rooms carries 05 Marks.
- Viva Voce will be conducted at the end of the semester of 05 Marks.
- One internal exam of 30 marks is conducted as a part of Mid Semester evaluation.

## **G. Students Learning Outcomes:**

On the successful completion of this course

- This will help to understand the requirement of property usage in design of steel structure and how theory developed with use of basic properties
- The students will gain an experience in implementation of design of steel structures on engineering concepts which are applied in field of structural engineering.
- The students will get a knowledge of design of steel engineering practices
- The students will learn to understand the theoretical and practical aspects of design of steel structure along with the planning and design aspects.

## **H. Recommended Study Materials:**

### **a. Text book & Reference Books:**

1. N.Subramanian; Steel Structures, Oxford Publication
2. K. S. Sai Ram; Design of Steel Structures, Pearson
3. Arya&Ajmani; Design of Steel Structures
4. Dayaratnam; Design of Steel Structures
5. B.C.Punamia; Steel Structures, Laxmi Publication B. Web Materials

### **b. Web Materials:**

1. <http://www.cdeep.iitk.ac.in/nptel>
2. <http://www.nptel.iitm.ac.in> B. Web Materials:

### **c. Indian Code of Practice:**

1. IS: 800 – 2007, General Construction in Steel — Code of Practice (Third Revision)

2. IS: 808 – 1989, Dimensions for hot – rolled steel beams, columns, channels and angle sections
3. Steel Hand Book SP 6
4. IS 802 (All Parts)
5. IS 6533 (Part 1 and 2)
6. IS 5503 (Part 1 and 2)
7. IS 9178 (Part 1, 2 and 3)