



Semester –VI

Subject Name: Structure Design & Drawing – II (Steel)

Subject Code: 09CI1601

Diploma Branches in which this subject is offered: Civil Engineering

Objective: Objectives of introducing this subject at third year level in Civil Engineering are:

- To develop skills for Design of Tension & Compression members of Steel Structure along with Foundation, Steel Beam and Welded and Bolt Connection as per IS 800-2007.
- To provide Structure Detailing of Different Steel Structure Components.

Credits Earned: 4

Course Outcomes:

On the completion of the course student will be able to:

- Understand basic principles of steel design.
- Design of bolted connections for steel structures using IS Codes IS: 800 and IS: 875
- Design of tension and compression members using IS Codes IS: 800 and IS: 875
- Read and interpret structural drawings & Draw steel section details for above component members

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE	IA	CSE	Viva	Term work	
2	0	4	4	50	30	20	25	25	150



Contents:

Unit	Topics	Contact hours	Weightage (%)
1	Introduction to steel structure and IS: 800-2007 <ul style="list-style-type: none">• Introduction to steel as construction material, Advantages and disadvantages of steel• Mechanical properties of structural steel, Stress-strain behavior of mild steel and high strength steel• Standard shapes of rolled steel section• Use of steel table & relevant IS code like IS: 800, IS: 875• Introduction to limit state method: meaning, types (limit state of strength & serviceability), factors of safety and load factors	02	05
2	Connections <ul style="list-style-type: none">• Bolted Connections:<ul style="list-style-type: none">▪ Types of bolts & their use, Advantages and disadvantages of bolted connections, lap and butt joints, modes of failure for bolted joints (in tension, shear and bearing)▪ Specifications for cross-sectional area, pitch, spacing, gauge, end distance, edge distance, bolt holes for bolted connections▪ Simple numerical on design strength of bolt in shear, tension and bearing• Welded Connections:<ul style="list-style-type: none">▪ Introduction and types of welds – butt and fillet, advantages and disadvantages of welded connections, size of weld, throat thickness▪ Procedure for analysis and design of welded joint (only fillet weld) for members subjected to axial load	06	20
3	Tension Member <ul style="list-style-type: none">• Standard Sections used as a tension member• Design Strength due to yielding of gross section, rupture of critical section & block shear• Design of tension members for angle and channel sections	06	20
4	Compression Member <ul style="list-style-type: none">• Sections used as compression member• Buckling class of cross section	06	20



	<ul style="list-style-type: none">• Effective length and slenderness ratio• Evaluate Design compressive stress and strength• Design of strut, simple column and built up column		
5	Beam <ul style="list-style-type: none">• Classification of cross section• Laterally supported and unsupported beam<ul style="list-style-type: none">▪ Strength of beam in flexure▪ Strength of beam in shear▪ Deflection limits	03	10
6	Slab Base Foundation <ul style="list-style-type: none">• Introduction of Slab Base and Gusseted Base Foundation• Design of Slab Base Foundation under Axially Load	04	10
7	Roof Truss <ul style="list-style-type: none">• Types and Elements of roof truss• Load on roof truss: Dead load, Impose load, Wind load and Load combinations• Determine load per panel point for Dead load, Impose load and Wind load• Design of the purlin and truss	05	15

Suggested Theory distribution:

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process.

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyse	Evaluate	Create
20%	30%	30%	20%	0%	0%



Suggested List of Experiments / Practical:

Sr. No.	Name of Topics	Contact Hrs
1	Types of bolts and symbols	4
2	Butt joint and lap joint	8
3	Design of tension members	8
4	Design of compression members	8
5	Design of columns using standard ISHB & ISSC sections	4
6	Design of symmetrical built-up columns using standard rolled I-sections	4
7	Flexural design of beam by various standard rolled section	4
8	Slab base & Gusseted base details	6
9	Types of trusses for different spans	4
10	Site visit of Industry Truss, Steel Structure railway platform	6
Total		56

Instructional Method:

- a. The course delivery method will depend upon the requirement of content and need of students. The teacher in addition to conventional teaching method by black board, may also use any of tools such as demonstration, role play, Quiz, brainstorming, MOOCs etc.
- b. The internal evaluation will be done on the basis of continuous evaluation of students in the laboratory and class-room.
- c. Students will use supplementary resources such as online videos, videos, e-courses, Virtual Laboratory.

Reference Books:

Sr. No.	Title of Book	Author	Publisher
1	Design of Steel Structures (By Limit State Method as Per IS:800 2007)	S. S. Bhavikatti	I. K. International Pvt. Ltd.
2	Limit State Design of Steel Structures	S. K. Duggal	Tata McGraw Hill Publisher Co. Ltd. New Delhi
3	Design of Steel Structures: Theory and Practice	N. Subramanian	Oxford University Press, New Delhi

IS, BIS & Other Standard Codes: *(should be permitted in examination)*

1. IS: 800-2007 and Handbook on Steel – SP 6
2. IS: 875-1987 Part 1 to 5 Indian Standard Code for Loading Standards