



SECOND SEMESTER 2020-2021

Course Handout Part II

Date: 16-01-2021

In addition to Part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : CE F343
Course Title : Design of Steel Structures
Instructor-in-Charge : Dr. P.N. Rao

Scope and Objective of the Course:

The course intends to impart design skills to common type of Civil Engineering Steel Structures as found in practice. This course serves as an introduction to basic design concepts, loads and stresses to be used as per Indian standards for steel structures design. It deals with design of steel structural elements and connections, such as tension members, compression members, beams, and beam columns; plate girders, bolted and welded connections. The primary course objective is to equip the students with the tools necessary for designing steel structures and to familiarize them with the relevant national design codes.

Course Outcomes: At the end of this course the students should be able to:

1. *Design and detail* steel bolted and welded connections as per IS 800:2007.
2. *Design and detail* steel tension and compressions members as per IS 800:2007.
3. *Design and detail* steel beams and plate girders as per IS 800:2007.

Student Learning Outcomes* (SLOs) assessed in this course – **(a), (b), (c), (f) & (k).**

Textbooks (TB):

- 1) N. Subramanian, “Steel Structures Design and Practice”, Oxford University Press. 2010.
- 2) *IS-800:2007 “Code of practice for General construction in steel”, Bureau of Indian Standards, New Delhi.
- 3) *R. Agor, “Steel Tables”, Birla. Publications, 2017.

Reference books (RB):

- 1) S K Duggal, “Limit State Design of Steel Structures”, TMH, 2011
- 2) A S Arya and Ajmani "Design of Steel Structures" Nem Chand & Bros 2011.
- 3) P. Dayaratnam “Design of Steel Structures”, Wheeler Pub. 1992.
- 4) S. S. Bhavikatti, “Design of Steel Structures (by Limit State Method as Per IS: 800—2007)”, IK International. 2010
- 5) IS-875:1987 "Code of practice for design Loads" Bureau of Indian Standards, New Delhi.
- 6) IS-808:1989 and SP-6 (1):1964: Handbook for structural steel sections. Bureau of Indian Standards, New Delhi. These publications provide geometric properties of IS rolled steel sections, connection



details, etc.

Course Plan:

Lecture No.	Topics Covered	Learning Objective	Chapter in TB	SLO
1-2	Introduction, Chemical and mechanical properties of steel, resistance to corrosion and fatigue, types of structural steel	Study the various properties of steel and types of structural steel	Ch.1&2	(a)
3-4	Steel design codes and specifications, design philosophies (working stress and Limit State), Load combinations	Study the overview of different methods of design for steel structures. Study the different loads and load combinations for design of steel structures.	Ch.1&2	(a)
5-10	Failure modes of bolts, codal provisions and designing bolted connections	Design and detail the bolted connections in steel structures	Ch.10	(a), (c), (k)
11-15	Types of welds, codal provisions and designing welded connections.	Design and detail welded connections in steel structures	Ch.11	(a),(c), (k)
16-20	Types of tension members, modes of failure, Net area, Net sectional area, Design, Lug Angles, Tension Splices, gussets.	Design and detail steel tension members, tension splices and gussets	Ch.3	(a),(c), (k)
21 - 26	Behavior of compression members, possible failure modes, single angle struts, design built- up compression members and column bases	Design and detail steel compression members, built up members and column bases	Ch.5	(a), (c), (k)
27 - 31	Types and classification, Lateral stability of beams, shear strength, shear strength, web buckling and crippling, and purlins.	Design and detail steel beams under flexure and shear.	Ch.6	(a), (c), (k)
32 -35	Types and Elements of Plate Girder, Preliminary Design procedure, design of Plate Girders using IS 800:2007 provisions	Design and detail steel plate girders as per IS 800:2007 provisions	Ch.7	(a), (c), (k)
36 – 42	Plastic theory, theorems of plastic collapse, methods of plastic analysis, plastic designs of portal frames, behavior and ultimate strength of plates.	Study the overview of plastic design for steel structures.	Ch.4	(a), (c)

* It is mandatory for each student to have the original IS-800:2007 code book and Steel Table.



***Student Learning Outcomes (SLOs):**

SLOs are outcomes (a) through (k) plus any additional outcomes that may be articulated by the program.

- (a) an ability to apply knowledge of mathematics, science and engineering
- (b) an ability to design and conduct experiments, as well as to analyze and interpret data
- (c) an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (d) an ability to function on multidisciplinary teams
- (e) an ability to identify, formulate, and solve engineering problems
- (f) an understanding of professional and ethical responsibility
- (g) an ability to communicate effectively
- (h) the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
- (i) a recognition of the need for, and an ability to engage in life-long learning
- (j) a knowledge of contemporary issues
- (k) an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Semester Test	90 Min.	30	04/03 11.00 -12.30PM	OPEN BOOK
Surprise Quizzes (Min.5 to Max.10)	-	15	Continuous	OPEN BOOK
Home Assignments (Min.3 to Max.6)	-	15	Continuous	OPEN BOOK
Comprehensive Exam	2 hrs.	40	10/05 AN	OPEN BOOK

Chamber Consultation Hour: To be announced later.

Notices: Notice concerning the course will be displayed in CMS.

Make-up Policy: Makeup will be given only to the genuine cases (medical reasons) with prior permission.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE

