



Birla Institute of Technology & Science, Pilani
Hyderabad Campus

ACADEMIC GRADUATE STUDIES AND RESEARCH DIVISION
FIRST SEMESTER 2023-2024
Course Handout (Part -II)

Date: 12.08.2023

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 G612
Course Title : ADVANCED STEEL STRUCTURES
Instructor-in-charge: Chandu Parimi

2. Scope and Objective of the Course:

Structural Steel is one of the most popular materials for construction of industrial buildings, bridges and other structures. This class is about studying advanced topics in structural steel analysis and design.

As a result of taking the course the students,

- Will be able to design steel structures and their connections.
- Will be able to work out examples using the concept of plastic analysis and design
- Will be able to perform fatigue analysis
- Will be able to understand the concept of cold formed steel and design based on new IS 801

Therefore, this course is necessary for students desirous of joining design offices or construction industry.

Topics to be covered in the subject are -

Steel properties; high strength steels, structural behaviour, analysis and design; loads and environmental effects; load and resistant factor design (LRFD); column and beams; connections; member under combined loads; bracing requirements; composite members; plastic analysis and design; tall steel buildings, detailing in steel structures.

3. Text Book:

- 1) N. Subramanian,(2008) “Design Of Steel Structures” , Oxford University Press.

4. Reference Books:

- 1) M. A. Bradford, N. S. Trahair, D. A. Nethercot, "The Behavior and Design of Steel Structures to BS5950", Spon Press.(2001)
- 2) "Teaching Resources for Structural Steel Design – Vol. I & II", INSDAG, Kolkatta.
- 3) Gaylord, E.H., Gaylord, N.C., and Stallmeyer, J.E.,(1992) "Design of Steel Structures", 3rd edition, McGraw-Hill Publications.
- 4) S.S Bhavikatti,(2009) "Design Of Steel Structures By Limit Method" , I. K. International Pvt Ltd.
- 5) Punmia, B.C.,(2010) Ashok Kumar Jain and Arun Kumar Jain, *Comprehensive design of steel structures*.
- 6) R.E.Englekirk, "Steel Structures (*Controlling Behavior through Design*)", John Wiley & Sons. Inc., New York, 1994.

5. Reference Code Provision

1. IS800-2007 "Code of Practice for General Construction in Steel", BIS.

6. Course Plan (Total of 40 lectures)

No of Lec.	Learning Objective	Topics to be covered	Lectures	Teaching Mode / Reference
(I) Introduction of Steel Structures				
	Introduction to member design	Design Philosophies – LSM, WSM, LRFD Overview of member design -tension members, compression members, beams, and beam columns. (Detailing)	1-3	Chalkboard / TB
	Connection design	<i>Type of connections</i> -Simple-Semi rigid and rigid connections Connection Configurations- Angle Cleat Connections- End-plate Connections-Semi-rigid Connections- Moment-rotation Characteristics <i>Welded connections</i> -Force flow in the joints – details of welding – types of welds-Concentric and eccentric connections (Detailing) <i>Bolted connections</i> – Prying force-Concentric and eccentric connections (Detailing)	4-14	Chalkboard / TB
(II) The Flexural Behavior of Stable Beam Systems				
	The Flexural Behavior of Stable Beam Systems	Characterizing the Flexural Behavior of Beams,	15-17	Chalkboard / TB
(III) Stability				
		Axial Stability, Codification of the Stability Limit State for Columns, Design Aids, Torsion, Torsional Stability of Beams, Combined Axial Load and Bending	18-22	Chalkboard / TB
(IV) Composite Member Design				
		Composite Beams and Estimating Vibration Characteristics of Floor systems	23-28	Chalkboard / TB
(V) Plastic Analysis and Design				

	Plastic analysis and design	Plastic behaviour under static and cyclic loading – plastic analysis and optimum design based on linear programming formulations – secondary effects – plastic design.	29-33	Chalkboard / TB
	Developing the Design of a Ductile Frame	Criterion Development, Conceptual Design of a Ductile Frame, Conceptual Design of an Irregular Ductile Frame to a Wind Criterion, Design Development, Connector Design and Detailing Considerations, Design Verification	34-38	Chalkboard / TB
(VI) Design Steel Structural systems				
	Steel Structural systems	TALL STRUCTURES – Introduction to issues with designing tall structures with examples. Bracing Concepts for Very Tall Buildings, Dynamic Behavior of Buildings	39-42	Chalkboard / TB

7. Evaluation Scheme:

Component	Duration	Weightage	Date & Time	Remarks
Midsem Test	1 hr	20%	11/10 - 4.00 - 5.30PM	OB
Project and Seminar	-	25%		OB
Development of design template		15%		OB
Compre. Exam	3 hrs	40%	13/12 AN	OB

8. Chamber Consultation Hour: To be announced in the class

9. Notice: Notices will be displayed on Civil Engg. Group Notice Board only.

10. 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
CE G612**