

NIRMA UNIVERSITY

Institute:	Institute of Technology
Name of Programme:	BTech in Civil Engineering
Course Code:	3CL105CC24
Course Title:	Design of Steel Structures
Course Type:	Core
Year of Introduction:	2024-25

L	T	Practical Component				C
		LPW	PW	W	S	
3	-	2	-	-	-	4

Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. apply various philosophies for design of steel structures (BL3)
2. assess and formulate a design approach for tension members (BL5)
3. evaluate compression members to develop an effective design strategy (BL5)
4. analyse and synthesise design solutions for flexural members (BL4)
5. design roof truss and purlin of an industrial building. (BL6)

Unit	Contents	Teaching hours (Total 45)
Unit-I	Design Methods Types of steel structures, Structural steel sections and properties, Design philosophies and relevant codal provisions, plastic theory, plastic hinges, shape factor, load factor, plastic analysis.	06
Unit-II	Tension Member Modes of failure, shear lag, built-up section, connections, design and detailing.	06
Unit-III	Compression Member Failure modes, local and global buckling, effective length, connections, design and detail of built-up sections, base plate.	12
Unit-IV	Flexural Member Behaviour of beams in flexure and shear, web crippling, web buckling, diagonal buckling, design of laterally supported and unsupported beams including connections.	11
Unit-V	Roof Truss Truss: types, load assessment, design of truss and purlin including connections; Introduction to Industrial Building components.	10

Self-Study:

The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents.



Suggested Readings/
References:

- Subramanian, N., *Design of Steel Structures-Limit State Method*, Oxford University Press.
- Duggal, S. K., *Limit State Design of Steel Structures*, Tata McGraw Hill.
- Shiyekar, M. R., *Limit State Design in Structural Steel*, PHI Learning.
- Bhavikatti, S.S., *Design of Steel Structures: by Limit State Method* as per IS:800 – 2007, I K publishing House.
- Gambhir, M. L., *Fundamentals of Structural Steel Design*, Tata McGraw-Hill Education.
- Ramamrutham, S., *Design of Steel Structures*, Dhanpat Rai Publishing Company.
- IS Codes: IS 456, IS800, IS 875, SP16, SP34, SP.6(1)

Laboratory work: Laboratory work will be based on the above syllabus with minimum 05 exercises to be incorporated.

Suggested List of Experiments:

Sr. No.	Name of Experiment/Exercise	Hours
1.	Design philosophies for steel structures	04
2.	Analysis and design of a tension member	04
3.	Analysis and design of compression members	08
4.	Analysis and design of flexural members	06
5.	Analysis and design of a roof truss	08