DESIGN OF STEEL STRUCTURES

ENCE 303

Lecture : 3 **Year : III**
Tutorial : 1 **Part : I**
Practical : 0

Course Objectives:
The objective of this course is to introduce the behavior and design of steel structural members, focusing on their response to various loads. It covers key failure modes and design principles. At the end of the course students will be able to apply theoretical knowledge and skill to solve problems on complex steel structures.

1 Introduction (4 hours)

1.1 Steel structure: Scope; advantages and disadvantages; types of steel structures
1.2 Structural steel and classification of steel sections
1.3 Design process and basis for design
1.4 Method of analysis and design
  1.4.1 Working stress method
  1.4.2 Limit state design method: Different limit states for steel design; Design strength of materials and design loads
  1.4.3 Ultimate load method
1.5 Prevailing codes and standards

2 Connections in Steel Structures (13 hours)

2.1 Connection in steel structure: Importance and its type
2.2 Welded connections: Welds and welding; Design of simple and eccentric welded connections
2.3 Bolted connections: Bolts and bolting; Design of simple and eccentric bolted connections
2.4 Riveted connections: Brief introduction

3 Tension Members (4 hours)

3.1 Tension members: Definition and type of tension members
3.2 Sectional area of tension members
3.3 Design of tension members of simple and built-Up section
3.4 Design of lug angle and tension splices

4 Flexure members (10 hours)

4.1 Steel beams and its type
4.2 Design of simple beam and built-up beams
4.3 Design of continuous beams
4.4 Design of plate girders
  4.4.1 Necessity and requirements of plate girders
  4.4.2 Design for bending, shear, deflection and lateral stability
  4.4.3 Curtailment of plates
  4.4.4 Design of web and flanged splices

5 Compression Members (10 hours)

5.1 Types of compression members
5.2 Buckling behavior of columns
5.3 Design of column of simple and built-up sections
5.4 Design of lateral bracing of compression members
5.5 Design of eccentrically loaded columns
5.6 Design of column bases
  5.6.1 Axially loaded column bases
  5.6.2 Eccentrically loaded column bases
5.7 Design of column splices

6 Design of Roof Trusses (4 hours)

6.1 Types and components of roof trusses
6.2 Loads on roof trusses
6.3 Wind load calculations
6.4 Design of roof components

Tutorial (15 hours)

1. Design of bolted connections
2. Design of welded connection
3. Analysis and design of tension members
4. Analysis and design of flexure members
5. Analysis and design of web-splice and stiffeners of plate girder
6. Analysis and design of compression members
7. Wind load calculations
8. Design of purlins

Course Project

1. A Course project on integrated design of a building/industrial structure or just a member using computer aided design (CAD)
2. A 3D model of a particular portion of a steel structure using papers and cardboards

Final Exam

The questions will cover all the chapters in the syllabus. The evaluation scheme will be as indicated in the table below:

Chapter	Hours	Mark distribution*
1	4	4
2	13	15
3	4	6
4	10	14
5	10	15
6	4	6
Total	**45**	**60**

* There may be minor deviation in marks distribution.

References

1. Duggal, S. K. (2010). Limit state design of steel structures. Tata McGraw-Hill Education.
2. Ram, S. (2010). Design of steel structures. Pearson Education India.
3. Ramamrutham, S. (1986). Design of Steel Structures (6th ed.). Dhanpat Rai Pub Company.
4. Subramanian, N. (2011). Steel structures: Design and Practice. Oxford University Press, USA.
5. Bhavikatti, S. (2009). Design of steel structures (By limit State method as per IS: 800 2007). I. K. International Pvt Ltd.
6. Suwal, R. (2015). Design of Steel Structure (By Limit State Method) (Reprint 2017). Mark Line Publication, Kathmandu.