Design of Steel and Timber Structure
BEG 361 CI

Year: III **Semester: II**

Teaching Schedule Hours/week			Examination Scheme						Total Marks
			Final				Internal Assessments		
			Theory		Practical		Theory	Practical	
L	T	P	Duration	Marks	Duration	Marks			
3	3	-	3	80	-	-	20	-	100

Course Objective:
This course is aimed to make students capable to design ordinary steel and timber structures and also prepare students for advanced knowledge on design of complex steel and timber structure.

Course Content:

1.0 Introduction to Steel Structures and Design Concepts (4 hrs)

1.1 Types of structural steel
1.2 Properties of structural steel (Stress-strain characteristics, allowable stresses and other mechanical properties)
1.3 Use of steel as structural members
1.4 Standards, codes and specifications for design of steel structures
1.5 Advantages and disadvantages of steel structures.
1.6 Allowable stress, ultimate strength and limit state

2.0 Types of Joints and Design (6 hrs)

2.1 Types of riveted / bolted and welded joints
2.2 Strength of riveted / bolted joints
2.3 Rivet value and efficiency
2.4 Design of riveted / bolted joints under axial and eccentric forces
2.5 Details of riveted / bolted joints
2.6 Design of welded joints under axial and eccentric forces
2.7 Details of welded joints

3.0 Design of Tension Members (4 hrs)

3.1 Various forms of tension members
3.2 Net sectional area and permissible stress
3.3 Design of angles, tee and channel sections
3.4 Concepts of tension splice

4.0 Axially Loaded Compression Member (4 hrs)

4.1 Strength of an axially loaded compression member
4.2 End conditions and effective length
4.3 Radius of gyration and slenderness ratio
4.4 Angle, tubular and built-up strut members
4.5 Design of compression members
4.6 Design of lacings and battens
4.7 Column splices
4.8 Design of bases for axially loaded columns

5.0 Eccentrically Loaded Compression Members (3 hrs)

5.1 Stress calculation
5.2 Design of members

6.0 Design of Beams (6 hrs)

6.1 Beams under transverse and axial loading
6.2 Bending, axial and shear stresses
6.3 Deflection criteria
6.4 Design of laterally supported and unsupported beams
6.5 Web crippling, buckling and stiffening

7.0 Design of Composite and Built-Up Beams (2 hrs)

7.1 Difference between composite and built-up beams
7.2 Types of built-up beams
7.3 Design of cover plates
7.4 Design of rivets / bolts connecting cover plates with flanges

8.0 Design of Plate Girders (3 hrs)

8.1 Elements of plate girder and economical depth
8.2 Flange design with curtailment
8.3 Design of web plates and stiffeners
8.4 Design of web and flange splices

9.0 Design of Roof Trusses (5 hrs)

9.1 Angular and Tubular Sections
9.2 Loads on roof trusses – Wind load, live load, dead load
9.3 Forces in truss elements
9.4 Design of purlins
9.5 Design and detailing of roof truss members and joints

10.0 Timber Structures (3 hrs)

10.1 Types and properties of timber
10.2 Advantage and disadvantage of timber structures
10.3 Various types of sections
10.4 Use of timber as a structural member
10.5 Permissible stresses in solid and laminated timber
10.6 Codes of practice for design of timber structures
10.7 Bamboo as a timber structure - Recent trends

11.0 Design of Timber Structures (5 hrs)

11.1 Design of compression member
11.2 Design of beams

References:

- L. S. Negi, Design of Steel Structures, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997.
- M. Raghupathi, Design of Steel Structures, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1997.
- S. Arya, J. L. Azmani, Design of steel Structures, Nem Chand & Bros, Roorkee, Fifth Edition, 1996
- Ramarutham, Design of Steel Structures
- Ramchandra, Design of Steel Structures
- Dayaratnam, Design of Steel Structures