Design of Steel and Timber Structure

Course Objective:

1. Make students capable to design ordinary steel and timber structures.
2. Prepare students for advanced knowledge on design of complex steel and timber structures.

1. Steel Structures and their Analysis and Design [4 hours]
    a. Introduction to Steel Structures
    b. Structural Steel and Classification of Steel Sections
    c. Method of Analysis and Design
    d. Design Process and Basis for Design
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2. Working Stress Design Method [2 hours]
    a. Basic Assumptions in Working Stress Design
    b. Service Load and Permissible Stresses
    c. Design in Tension, Compression, Bending and Shear
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3. Limit State Design Method [3 hours]
    a. Safety and Serviceability Requirements of Structure
    b. Different Limit States for Steel Design
    c. Design Strength of Materials and Design Loads
    d. Limit State of Strength
    e. Limit State of Serviceability
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4. Connections in Steel Structures [10 hours]
    a. Types of Connections
    b. Welded Connections
        i. Welds and welding
        ii. Design of simple welded connections
        iii. Design of eccentric welded connections
    c. Bolted Connections
        i. Bolts and bolting
        ii. Design of simple bolted connections
        iii. Design of eccentric bolted connections
    d. Introduction to Riveted Connection
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5. Tension Members [4 hours]
    a. Types of Tension Members
    b. Sectional Area of Tension Member
    c. Design of Tension Members of Simple and Built-Up Section
    d. Design of Lug Angle
    e. Tension Splice
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6. Compression Members [10 hours]
    a. Types of Compression Member
    b. Buckling Behavior of Column
    c. Design of Column of Simple and Built-Up Section
    d. Design of Lateral Bracing of Compression Member
    e. Design of Eccentrically Loaded Column

f. Design of Column Bases
    i. Axially loaded column bases
    ii. Eccentrically loaded column bases
g. Design of Column Splices

7. Flexure Members [13 hours]
    a. Types of Beams
    b. Design of Simple Beam
    c. Design of Built-Up Beam
    d. Design of Plate Girder
        i. Element of plate girders
        ii. Preliminary design
        iii. Design for bending, shear, deflection and lateral stability
        iv. Curtailment of plate
        v. Design of web and flange splice

8. Design of Roof Trusses [4 hours]
    a. Types of Roof Truss and Components of Roof Truss
    b. Loads on Roof Truss
    c. Design of Roof Components

PART B: TIMBER STRUCTURES
1. Timber Structures and Design Methods [2 hours]
    a. Introduction to Timber Structures
    b. Structural Timber and Factors Affecting the Strength of Timber
    c. Design Methods and Basis for Design

2. Joints in Timber Structures [2 hours]
    a. Types of Joints
    b. Design of Bolted Joints
    c. Design of Nailed Joints

3. Design of Compression Members [3 hours]
    a. Types of Timber Columns
    b. Design of Timber Column
    c. Introduction to Column Bases

4. Design of Flexure Member [3 hours]
    a. Types of Beams
    b. Design of Timber and Flitched Beam

Course Project:
1. A Course Project on integrated design of a building/industrial structure

Reference books:

1. "Limit State Design of Steel Structures" S.K. Duggal Tata McGraw-Hill Publishing Com.
2. "Design of Steel Structures" K.S. Sai Ram, PEARSON Education
3. "Design of Steel Structures" L.S. Negi, Tata McGraw-Hill Publishing Com.
4. "Design of Steel Structures" Ram Chandra, Standard Book House