DESIGN OF STEEL STRUCTURES

Course Code: 13CE1124

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Course Educational Objectives:

- To impart the basic concepts about design of Steel Structures like flexural compression and tension members
- To familiarize the understanding of the basic concepts for design of beams, column bases, connections, and roof trusses by limit state method as per IS 800-2007.

Course Outcomes:

- Student will be able to design the structural members under tension, compression, shear and bending.
- Student will be able to demonstrate the application of particular connection system in given situation.

UNIT-I (12 Lectures)

WELDED AND BOLTED CONNECTIONS:

Introduction, Advantages and disadvantages of welding- Strength of welds-Butt and Fillet welds: Permissible stresses – IS Code requirements. Design of Butt weld and fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.

UNIT-II (14 Lectures)

BEAMS:

Introduction to plastic analysis, Design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, check for deflection, shear, buckling and bearing, for laterally supported and unsupported beams.

UNIT-III (14 Lectures)

TENSION MEMBERS:

General design of members subjected to direct tension.

COMPRESSION MEMBERS:

Effective length of columns, Slenderness ratio – permissible stresses, Design of compression members, Struts etc.

COLUMNS & BUILT UP COLUMNS:

Design of Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns and splicing of columns.

UNIT-IV (12 Lectures)

DESIGN OF COLUMN BASES:

Design of slab base and gusset base. Column bases subjected to moment.

UNIT-V (14 Lectures)

ROOF TRUSSES:

Different types of trusses – Design loads – Load combinations, IS Code 800-2007 recommendations, structural details – Design of simple roof trusses involving the design of purlins.

Note: The students should prepare the following plates.

Plate 1 Detailing of simple beams

Plate 2 Detailing of compound beams including curtailment of flange plates.

Plate 3 Detailing of Column including lacing and battens.

Plate 4 Detailing of Column bases – slab base and gusset base

Plate 5 Detailing of steel roof trusses including particulars at joints.

TEXT BOOKS:

1. Bhavikatti, *"Design of Steel Structures"*, 6th Edition, University Press. Hyderabad, 2010.
2. S.K. Duggal, *"Limit state design of steel structures"*, 1st Edition, TMH publication, 2011
3. N.Subramaniyan, *"Design of Steel structures"*, 1st Edition, Oxford university press, 2008.

REFERENCES:

1. B.C. Punmia, *"Comprehensive Design of Steel structures"*, 10th Edition, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi, 2007.
2. P. Dayaratnam, *"Design of Steel Structures"*, 2nd Edition, S. Chand Publishers, 2009.
3. Prof. Dr. V.L. Shah, Prof. Veena Gore, "Limit State Design of Steel Structures", 1st Edition, Structures Publications, 2009.

IS Codes:

1. IS -800 – 2007, *"Codes of Practice for General Construction in Steel"*, BIS, 2007
2. IS – 875 – Part III, *"Codes of Practice for Design Loads"* (other than Earthquake, for Buildings and Structures), 1987.
3. Steel Tables.

These codes and steel tables are permitted in the examinations.