IV Year I Semester L T P C
Code: 17CE735 3 1 0 0

INDUSTRIAL STEEL STRUCTURES (Dept.Elective-II)

Course Learning Objectives

The objectives of this course are:

- 1. To study Limit analysis of steel structures, Mechanical properties of structural steel, Plastic hinge, Moment curvature relations, Upper lower bound theorems. Redistribution of moments.
- 2. To study Portal frame, Mechanisms, Combination of mechanisms, Instantaneous Centre, The rigid frame, the instantaneous center of rotation, Multistorey Frames, Combination of mechanisms.
- 3. To study Light gauge steel structures, Local buckling of thin sections, Light gauge steel columns and compression members, Form factor for columns and compression members,
- 4. To study the analysis of Stiffened compression elements, Multiple stiffened compression elements.
- 5. To study Design of Steel Towers, Trestles and Masts, Loads on towers, Sag (dip) and Tension in uniformly loaded conductors, Stress in trestle due to vertical loads, Stress in trestles due to horizontal loads, Design of members in towers.
- 6. To study Analysis of Mill Bents, Types of mill bents, Loads on mill bents, Assumption made in mill bent analysis, Analysis for wind loads, For various edge conditions of mill bents.

Course Outcomes:

Students will get ability

- 1. To learn Limit analysis of steel structures, Mechanical properties of structural steel, Plastic hinge, Moment curvature relations, Upper lower bound theorems. Redistribution of moments.
- 2. To learn Portal frame, Mechanisms, Combination of mechanisms, Instantaneous Centre, The rigid frame, the instantaneous center of rotation, Multistorey Frames, Combination of mechanisms.
- 3. To learn Light gauge steel structures, Local buckling of thin sections, Light gauge steel columns and compression members, Form factor for columns and compression members,
- 4. To learn the analysis of Stiffened compression elements, Multiple stiffened compression elements.
- 5. To learn Design of Steel Towers, Trestles and Masts, Loads on towers, Sag (dip) and Tension in uniformly loaded conductors, Stress in trestle due to vertical loads, Stress in trestles due to horizontal loads, Design of members in towers.
- 6. To learn Analysis of Mill Bents, Types of mill bents, Loads on mill bents, Assumption made in mill bent analysis, Analysis for wind loads, for various edge conditions of mill bents.

SYLLABUS

UNIT-I

Introduction: Limit analysis of steel structures, Mechanical properties of structural steel, Plastic hinge, Moment curvature relations, Limit load, Coplanar load, Upper lower bound theorems. Redistribution of moments continuous beams: Relevant or irrelevant mechanisms, Types of mechanisms method for performing moment check.

UNIT-II

Portal frames, Mechanisms, Combination of mechanisms, Moment check. Partial complete and over complete collapse. Instantaneous Centre: The rigid frame, The instantaneous center of rotation, Multistorey Frames: Combination of mechanisms.

UNIT-III

Light gauge steel structures: Local buckling of thin sections, Post packing of thin elements, Light gauge steel columns and compression members, Form factor for columns and compression members.

UNIT-IV

Analysis of Stiffened compression elements, Multiple stiffened compression elements, Unstiffened compression elements effective length of light gauge steel compression members, Basic design stress, Allowable design stress.

UNIT-V

Design of Steel Towers, Trestles and Masts: Loads on towers, Sag (dip) and Tension in uniformly loaded conductors, Analysis of towers (analysis as coplanar assembly of trestles), Mast, Trestle, Stress in trestle due to vertical loads, Stress in trestles due to horizontal loads, Design of members in towers.

UNIT-VI

Analysis of Mill Bents: Types of mill bents, Loads on mill bents, Assumption made in mill bent analysis, Analysis for wind loads, For various edge conditions of mill bents, Mill bents with double columns shear and moment diagrams, Wind loads analysis for two step columns.

REFERENCES:

- 1. "Plastic Analysis of Structures" by Beedle.
- 2. "Fundamentals of Structural Analysis" by Jakkula& Stephenson, Von Nostrand, East West Press.
- 3. "Design of Steel Structures" by Arya & Ajmani, Nemchand Publishers.