

Advanced Steel Design

01ST1201 (PCC)

Objective of the Course:

- To learn advanced design concepts for structural steel applicable to various types of steel structures.
- To understand primary code source applies to building design, which is supplemented by a strong theoretical background in steel behavior applicable to non-typical structures.

Credit Earned: 3
Students learning outcomes:

After successful completion of the course, it is expected that student will be able to

- Apply design philosophy for various types of steel connection.
- Analyse and design the beams and frames using plastic method.
- Design & detail Industrial shed as per the IS codal provisions
- Application of cold form sections in the steel structure including pre-engineered building.

Teaching and Examination Scheme

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	CSE (I)	IA (M)	Viva (V)	Term Work (TW)	
03	00	00	03	50	20	30	25	25	150

Detailed Syllabus

Sr No.	Title of the unit	Number of hours
1	Introduction	03
	Mechanical Properties, Hysteresis, Ductility, Compactness and non-compactness, slenderness, residual stresses. Local Buckling of Compression Flange & Web, Lateral Torsional Buckling, Types of Loading, Wind Load Analysis Local Buckling of Compression Flange & Web, Lateral Torsional Buckling. <i>Design of Connection:</i> Beam to beam connection, Beam to column connection, Semi-rigid connection	
2	Plastic Behavior of Structural Steel:	10
	Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorem of Plastic collapse, Methods of Plastic analysis.	

3	Design of Industrial Shed:	12
	Introduction, selection of bay width, structural framing, purlins, girts and eave strut, plane trusses, Design of Gantry girders.	
4	Advancement in Steel Design:	15
	<i>Design of Cold Form Section:</i> Advantages, stiffened and un stiffened elements, local buckling and post buckling strength, shear lag and flange curling, unusually wide flange section, short span sections, members subjected to axial tension, compression and bending. Design of Hollow Steel Section, Pre-Engineered Buildings.	

Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
5%	5%	20%	25%	25%	20%

Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

Recommended Study Material:

Reference Book:

1. N. Subramanian, Design of Steel Structures: Theory and Practice, Oxford University.
2. V. L. Shah and Veena Gore, Limit State Design of Steel Structures IS: 800-2007, Structures.
3. S. S. Bhavikatti, Design of Steel Structures by Limit State Methods as Per IS 800-2007, I & K. International.
4. M. R. Shiyekar, Limit State Design in Structural Steel, PHI Learning.
5. S. K. Duggal, Limit State Design of Steel Structures, Tata McGraw Hill.
6. M. L. Gambhir, Fundamentals of Structural Steel Design, McGraw Hill Education.
7. IS Codes: IS: 800, IS: 801, IS: 811 IS: 875, SP: 6 and Steel Table.
8. Ramchandra, Design of Steel Structures - Vol. II, Standard Book House, Delhi.
9. Arya A. S., Ajmani J. L., Nemchand and Bros., Design of Steel Structures, Roorkee.
10. Neal B. G., Plastic Methods of Structural Analysis, Chapman and Hall London.