

DESIGN OF STEEL STRUCTURES AND DRAWING

VII Semester: CE								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
ACE012	Core	L	T	P	C	CIA	SEE	Total
		3	1	-	4	30	70	100
Contact Classes: 45	Tutorial Classes: 15	Practical Classes: Nil			Total Classes: 60			

COURSE OBJECTIVES:

The course should enable the students to:

- I. Discuss the concepts of structural steel design conforming to the IS 800 design code.
- II. Identify various types of structural steel and its properties also define concepts of Limit State Design.
- III. Analyse structures using plastic method of analysis and evaluate collapse load and plastic moment capacity.
- IV. Design compression members, beams, connections and girders.

COURSE OUTCOMES (COs):

CO 1: Know the materials, making of iron and steel, types of structural steel, mechanical properties of steel, concepts of plasticity yield strength, loads and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit state design – different limit states as per IS 800:2007. Design strengths deflection limits, serviceability, bolted connections, welded connections, efficiency of joint, prying action types of welded joints, design of tension members, design strength of members.

CO 2: Know the design of compression members, buckling class, slenderness ratio, strength design, laced battened columns, column splice, column base, slab base.

CO 3: Know the design of beams, plastic moment, and bending and shear strength laterally supported beams. Design, built up sections, large plates web buckling, crippling and deflection of beams, design of purlin.

CO 4: Know the design of eccentric connections with brackets, beam end connections, web angle, unstiffened and stiffened seated connections (bolted and welded types) and design of truss joints.

CO 5: Know the design of welded plate girders, optimum depth, design of main section, design of end bearing stiffness and intermediate stiffness. Connection between web and flange and design of flange splice and web splices.

COURSE LEARNING OUTCOMES (CLOs):

- 1. Know the materials, making of iron and steel.
- 2. Know the types of structural steel, mechanical properties of steel.
- 3. Know the concepts of plasticity yield strength.
- 4. Understand loads and combinations loading wind loads on roof trusses.
- 5. Understand behavior of steel, local buckling.
- 6. Concept of limit state design – different limit states as per IS 800:2007.
- 7. Concept of design strengths deflection limits, serviceability.
- 8. Evaluate the bolted connections.

9. Evaluate welded connections, efficiency of joint. 10. Analyze the prying action types of welded joints. 11. Understand the design of tension members and design strength of members. 12. Understand the design of compression members, buckling class, slenderness ratio. 13. Understand the strength design, laced battened columns. 14. Understand the design of column splice, column base, and slab base. 15. Understand the design of beams, plastic moment. 16. Analyse the bending and shear strength laterally supported beams. 17. Understand the design, built up sections, large plates web buckling. 18. Analyse the crippling and deflection of beams, design of purlin. 19. Understand the design of eccentric connections with brackets. 20. Analyse the beam end connections, web angle, unstiffened and stiffened seated connections, and design of truss joints. 21. Understand the design of welded plate girders, optimum depth, and design of main section. 22. Understand the design of end bearing stiffness and intermediate stiffness. 23. Analyze the Connection between web and flange and design of flange splice and web splices.		
UNIT-I	INTRODUCTION ON MECHANICAL BEHAVIOUR OF STEEL	Classes: 10
Materials, making of iron and steel, types of structural steel, mechanical properties of steel, concepts of plasticity yield strength, loads and combinations loading wind loads on roof trusses, behavior of steel, local buckling. Concept of limit state design – different limit states as per IS 800:2007. Design strengths deflection limits, serviceability, bolted connections, welded connections, efficiency of joint, prying action types of welded joints, design of tension members, design strength of members.		
UNIT -II	COMPRESSION MEMBERS	Classes: 09
Design of compression members, buckling class, slenderness ratio, strength design, laced battened columns, column splice, column base, slab base.		
UNIT -III	BEAMS	Classes: 09
Design of beams, plastic moment, and bending and shear strength laterally supported beams. Design of built up sections, large plates web buckling, crippling and deflection of beams, design of purlin.		
UNIT -IV	ECCENTRIC CONNECTIONS	Classes: 08
Design of eccentric connections with brackets, beam end connections, web angle, unstiffened and stiffened seated connections (bolted and welded types), design of truss joints.		
UNIT -V	WELDED PLATE GIRDERS	Classes: 09
Design of welded plate girders, optimum depth, design of main section, design of end bearing stiffness and intermediate stiffness. Connection between web and flange and design of flange splice and web splices.		
Text Books:		
1. S. K. Duggal, “Limit state design of steel structures”, Tata McGraw-Hill, 3 rd Edition, 2019. 2. N. Subramanian, “Design of steel structures”, Oxford University Press, 2 nd Edition, 2018.		

Reference Books:

1. K. S. Sai Ram, “Design of steel structures”, Pearson Education, 2010.
- 2 Edwin H. Gaylord, Jr. Charles N. Gaylord and James Stallmeyer, “Design of steel structures”, Tata McGraw-Hill Education private Limited, 3rd Edition, 2010.
3. Ramachandra, “Design of steel structures Volumes 1 and 2”, Standard Publications, 2009.
4. S.S. Bhavikatti, “Design of steel structures”, IK International Publication House, New Delhi, 2010.

Web References:

1. <http://www.nptel.ac.in/downloads/105106112/>
2. <http://iitmweb.iitm.ac.in/phase2/courses/105103094/12>
3. <http://freevidelectures.com/Course/2679/Design-Of-Steel-Structures>

E-Text Books:

1. <http://www.freeengineeringbooks.com/Civil/Steel-Structure-Design-Books.php>
2. https://books.google.co.in/books/about/Comprehensive_Design_of_Steel_Structures.html?id=pXekq3F