

B. E. CIVIL ENGINEERING			
Choice Based Credit System (CBCS) and Outcome Based Education (OBE)			
SEMESTER - VI			
DESIGN OF STEEL STRUCTURAL ELEMENTS			
Course Code	18CV61	CIE Marks	40
Teaching Hours/Week(L:T:P)	(3:2:0)	SEE Marks	60
Credits	04	Exam Hours	03
Course Learning Objectives: This course will enable students to			
<ol style="list-style-type: none"> 1. Understand advantages and disadvantages of steel structures, steel code provisions, and plastic behaviour of structural steel. 2. Learn Bolted connections and Welded connections. 3. Design of compression members, built-up columns and columns splices. 4. Design of tension members, simple slab base and gusseted base. 5. Design of laterally supported and un-supported steel beams. 			
Module -1			
Introduction: Advantages and Disadvantages of Steel Structures, Limit state method Limit State of Strength, Structural Stability, Serviceability Limit states, Failure Criteria of steel, Design Consideration, Loading and load combinations, IS code provisions, Specification and Section classification.			
Plastic Behavior of Structural Steel: Introduction, Plastic theory, Plastic Hinge Concept, Plastic collapse load, load factor, Shape factor, Theorem of plastic collapse, Methods of Plastic analysis, Plastic analysis of Continuous Beams.			
Module -2			
Bolted Connections: Introduction, Types of Bolts, Behavior of bolted joints, Design of High Strength friction Grip (HSFG) bolts, Design of Simple bolted Connections (Lap and Butt joints) and bracket connections.			
Welded Connections: Introduction, Types and properties of welds, Effective areas of welds, Weld Defects, Simple welded joints for truss member and bracket connections, Advantages and Disadvantages of Bolted and Welded Connections.			
Module -3			
Design of Compression Members: Introduction, Failure modes, Behavior of compression members, Sections used for compression members, Effective length of compression members, Design of compression members and built up Compression members, Design of Laced and Battered Systems.			
Module -4			
Design of Tension Members: Introduction, Types of Tension members, Slenderness ratio, Modes of Failure, Factors affecting the strength of tension members, Design of Tension members and Lug angles, Splices, Gussets.			
Design of Column Bases: Design of Simple Slab Base and Gusseted Base.			
Module -5			
Design of Beams: Introduction, Beam types, Lateral Stability of beams, factors affecting lateral stability, Behavior of Beams in Bending, Design strength of laterally supported beams in Bending, Design of Laterally unsupported Beams [No Numerical Problems], Shear Strength of Steel Beams. Beam to Beam Connections, Beam to Column Connection and Column Splices [No Numerical Problems].			
Course Outcomes: After studying this course, students will be able to:			
<ol style="list-style-type: none"> 1. Possess knowledge of Steel Structures Advantages and Disadvantages of Steel structures, steel code provisions and plastic behaviour of structural steel. 2. Understand the Concept of Bolted and Welded connections. 3. Understand the Concept of Design of compression members, built-up columns and columns splices. 4. Understand the Concept of Design of tension members, simple slab base and gusseted base. 5. Understand the Concept of Design of laterally supported and un-supported steel beams. 			
Question paper pattern:			
<ul style="list-style-type: none"> • The question paper will have ten full questions carrying equal marks. • Each full question will be for 20 marks. 			

- There will be two full questions (with a maximum of four sub- questions) from each module.
- Each full question will have sub- question covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Textbooks:

1. N Subramanian., “Design of Steel Structures” (2016), Oxford University Press, New Delhi.
2. Duggal S K., “Limit State Method of Design of Steel Structures”, Tata McGraw Hill, New Delhi.

Reference Books:

1. Dayarathnam P, “Design of Steel Structures”, Scientific International Pvt. Ltd.
2. Kazim S M A and Jindal R S, “Design of Steel Structures”, Prentice Hall of India, New Delhi.
3. IS 800-2007: General Construction in Steel Code Practice (Third revision), Bureau of Indian Standards, New Delhi.