DESIGN AND DRAWING OF STEEL STRUCTURES
(SYLLABUS)

Course Code	23CE3601	Year	III	Semester	II
Course Category	Core	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	Structural Analysis, Building Planning and Drawing
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

- Familiarize students with different types of connections and relevant IS codes
- Equip student with the concepts of designing flexural members
- Understand design concepts of tension and compression members in trusses
- Familiarize students with different types of columns and column bases and their design
- Familiarize students with Plate girder and Gantry Girder and their design

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Design bolted and Welded connections and determine their capacities using IS Codes.	**L4**
CO 2	Analyze the behaviour of steel tension members, compression members, and beams and apply IS Code requirements in their design.	**L4**
CO 3	Design roof trusses, including purlins, members, and joints, using appropriate design loads and load combinations as per IS Codes.	**L5**
CO 4	Design column bases (slab base and gusseted base) and evaluate their ability to safely transfer loads to the foundations.	**L5**
CO 5	Design built-up compression members, plate girders, and gantry girders and detail their stiffeners, lacing/battens, and splices.	**L5**

Course Articulation Matrix:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	2		1					1		2	3	2
CO2	3	3	3		1					1		2	2	2
CO3	3	3	3		1					1		2	3	2
CO4	3	3	3		1					1		2	3	2
CO5	3	3	3		1					1		2	3	2
Avg	3	3	3	-	1	-	-	-	-	1	-	2	3	2

Syllabus

Unit No	Content	Mapped COs
I	**Connections:** Bolted connections – definition, bolt strength and capacity, Welded connections: Introduction, Advantages and disadvantages of welding-Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements. Design of fillet weld subjected to moment acting in the plane and at right angles to the plane of the joints.	**CO1**
II	**Beams**: Allowable stresses, design requirements as per IS Code-Design of simple, problems and compound beams only design theory-Curtailment of flange plates, Beam to beam connection, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.	**CO2**
III	**Tension Members and compression members:** Effective length of members, slenderness ratio-permissible stresses. Design of compression members subjected to axial and eccentric loading. Design of members subjected to direct tension and bending. **Roof Trusses:** Different types of roof trusses – Design loads – Load combinations as per IS Code recommendations, structural details –Design of purlins, members and joints.	**CO2, CO3**
IV	**Design of Columns:** Built up compression members – Design of lacings and battens using channel sections **Design of Column Foundations:** Design of slab base and gusseted base.	**CO4, CO5**
V	**Design of Plate Girder:** Design consideration – IS Code Recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections. **Design of Gantry Girder:** Impact factors - longitudinal forces, Design of Gantry girders.	**CO5**

NOTE: Welding or bolted connections should be used in Units II – V. Drawing classes must be conducted every week and 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 gusseted base
Plate 5 Detailing of steel roof trusses including joint details.
Plate 6 Detailing of Plate girder including curtailment, splicing and stiffeners.
Plate 7 Detailing of gantry girder.

FINAL EXAMINATION PATTERN:

The end examination paper should consist of Part A and Part B. part A consist of two questions in Design and Drawing out of which one question is to be answered. Part B should consist of five questions and design out of which three are to be answered. Weightage for Part – A is 40% and Part- B is 60%.

Learning Resource(s)
Text Book(s)
1. 'Steel Structures Design and Practice' by N.Subramanian, Oxford University Press. 2. 'Design of Steel Structures' by Ramachandra, Vol – 1, Universities Press. 3. 'Design of steel structures' by S.K. Duggal, Tata Mcgraw Hill, and New Delhi.
Reference Book(s)
1. 'Structural Design in Steel' by SarwarAlamRaz, New Age International Publishers, New Delhi. 2. 'Design of Steel Structures' by P. Dayaratnam; S. Chand Publishers. 3. 'Design of Steel Structures' by M. Raghupathi, Tata Mc. Graw-Hill. 4. 'Structural Design and Drawing' by N. Krishna Raju; University Press.

Faculty **HoD-CE**