3/4 B.Tech. SIXTH SEMESTER

CE6T1 DESIGN AND DRAWING OF STEEL STRUCTURES Credits: 4

Lecture: 4 periods/week **Internal assessment: 30 marks**
Tutorial: 1 period /week **Semester end examination: 70 marks**

Objectives:

- To learn the design philosophies of limit state design.
- To develop knowledge in designing of structural elements in steel.

Learning outcomes:

At the end of course the student will have:

- Knowledge of the properties of steel and design basics.
- Understanding of different types of connections in steel constructions
- Capability to design steel members subjected to tension and compression.

UNIT - I
CONNECTIONS:
Riveted connections –definition, rivet 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 welds subjected to moment acting in the plane and at right angles to the plane of joints.

UNIT – II
BEAMS:
Allowable stresses, design requirements as per IS Code-Design of simple and compound beams-Curtailment of flange plates, Beam to beam connections, check for deflection, shear, buckling, check for bearing, laterally unsupported beams.

UNIT –III
TENSION MEMBERS AND COMPRESSION MEMBERS:
General Design of members subjected to direct tension and bending – effective length of columns. Slenderness ratio – permissible stresses. Design of compression members, struts etc.

UNIT – IV
COLUMNS:
Design of Built up compression members – Design of lacings and battens. Design Principles of Eccentrically loaded columns, splicing of columns.

UNIT – V
DESIGN OF COLUMN FOUNDATIONS:
Design of slab base and gusseted bases.

UNIT - VI
ROOF TRUSSES:
Different types of trusses –Design loads– Load combinations IS Code recommendations, structural details – Design of simple roof trusses involving the design of purlins, members and joints.

UNIT – VII
PLATE GIRDER:
Design consideration – IS Code recommendations Design of plate girder-Welded – Curtailment of flange plates, stiffeners – splicing and connections.

UNIT - VIII
GANTRY GIRDER:
Impact factors - longitudinal forces, Design of Gantry girders.

Note: 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 particulars at joints.
Plate 6 Detailing of Plate girder including curtailment, splicing and Stiffeners.

FINAL EXAMINATION PATTERN:
The end examination paper should consist of Part A and Part B. Part A consists 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 resources

Text books:

1. Design of Steel Structures by limit state method as per IS 800-2007 by Bhavikatti, S.S., I.K. International Publishing House Pvt. Ltd, 2009.
2. Steel Structures Design and Practice by Subramanian N., Oxford University Press. 2009.

References:

1. Design of Steel Structures, (3rd edition) by Duggal S.K., Tata Mcgraw-Hill, New Delhi, 2012.
2. Design of Steel Structures, (3rd edition) by Raghupathi M., Tata McGraw-Hill, 2006
3. Structural design in steel by Sarwar Alam Raz, New Age International Publishers, New Delhi, 2002.

IS CODES:
1. IS -800 – 2007
2. IS – 875 – Part III
3. Steel Tables.

These codes and steel tables are permitted in the examinations.