INSTITUTE	**FACULTY OF TECHNOLOGY**
PROGRAM	**BACHELOR OF TECHNOLOGY (CIVIL ENGINEERING)**
SEMESTER	**7**
COURSE TITLE	**DESIGN OF STEEL STRUCTURES**
COURSE CODE	**01CI0716**
COURSE CREDITS	**3**

Objective:

1. Develop the capability to analyze and design connections by Indian Standard code provisions, ensuring structural integrity and safety in various construction projects
2. Acquire the skills necessary to design the components of industrial structures following Indian Standard code provisions, considering factors such as loading conditions, material properties, and structural stability
3. Gain proficiency in the design of diverse steel structures, including plate girders and foot-over bridges, adhering to Indian Standard code provisions
4. Apply the principles of plastic design effectively in the analysis and design of steel beams and portal frames, integrating considerations such as load redistribution and ductility enhancement for robust structural performance

Course Outcomes: After completion of this course, student will be able to:

1. Prepare the structural layout of various types of steel structures.
2. Apply the principles of plastic design for steel structural members.
3. Evaluate the stability and structural integrity of steel structures considering factors such as loading conditions and material properties.
4. Design the components of industrial structures according to Indian Standard codes.

Pre-requisite of course: Structural Analysis, Elementary Design of Structures

Teaching and Examination Scheme

Theory Hours	Tutorial Hours	Practical Hours	ESE	IA	CSE	Viva	Term Work
3	0	0	50	30	20	25	25

Contents : Unit	Topics	Contact Hours
1	**Connections** Design and Detailing of Various Connection, Simple Connection, Lap and Butt Joints, Truss Joint Connection, Clip and Seat angle connections, Web angle connections, Unstiffened and Stiffened Connections, Beam to Beam Connection, Beam to Column Connection, Semi Rigid Connection, Simple Welded Joints, Shear and Moment Resisting Connections	8

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Contents : Unit	Topics	Contact Hours
2	**Design of Industrial Building** Structural layout of an industrial building, Various types of trusses, roofing, and their selection, assessment of loads, the effect of wind and earthquake loads, analysis and design of Roof Trusses, Components: Roofing system, Trusses, Purlins, Girts, column, lateral load resisting system, Bracing Systems, gantry girder, footing, Gantry girder: Loading Characteristics, static and moving loads, selection of gantry girder, design of gantry girder	12
3	**Plate Girder** Modes of failure: Elastic buckling, bending in the plane of the web, Local buckling, buckling in the plane of the web, Vertical buckling of the compression flange, Shear buckling, Design of bolted, welded plate girder by Tension field Method & Simple Post Critical Method including design of vertical & horizontal stiffeners, Splices, Curtailment, and Design of various elements of plate girder	8
4	**Design of Foot-Over Bridges** Structural system of through & deck type bridges, design of foot-over bridge & its Supporting system	6
5	**Plastic Design** Introduction, Plastic theory, Plastic hinge concept, Plastic collapse load, conditions of plastic analysis, Theorem of Plastic collapse, Methods of Plastic analysis, Plastic Analysis of Beams and Frames, Plastic Design of beam	8
Total Hours		**42**

Textbook :

1 Design of Steel Structures: Theory and Practice, N. Subramanian, Oxford University, 2008

2 Limit State Design of Steel Structures, S. K. Duggal, Tata McGraw Hill, 2012

References:

1 Limit State Design of Steel Structures IS: 800-2007, Limit State Design of Steel Structures IS: 800-2007, V. L. Shah and Veena Gore, Structures, 2011

2 Design of Steel Structures by Limit State Methods as Per IS 800-2007, I & K, Design of Steel Structures by Limit State Methods as Per IS 800-2007, I & K, S. S. Bhavikatti, International, 2014

3 Limit State Design in Structural Steel, Limit State Design in Structural Steel, M. R. Shiyekar, PHI Learning, 2012

Suggested Theory Distribution:

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

Distribution of Theory for course delivery

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Remember / Knowledge	Understand	Apply	Analyze	Evaluate	Higher order Thinking / Creative
5.00	10.00	25.00	30.00	20.00	10.00

Instructional Method:

1 At the start of the course, the course delivery pattern and prerequisite of the subject will be discussed

2 Lectures will be taken in the classroom with the use of multi-media presentations, whiteboard– a mix of both.

3 Attendance is compulsory in lectures which carries a 5% component of the overall evaluation.

4 About 10 to 15% of the topics/ sub-topics, which are relatively simple, are to be given to the students for self-learning and collaborative learning methods. The assessment of Cos for the particular topics will be through classroom presentations

5 Guide Students to undertake a micro-project/ physical model of the various elements.

6 Minimum two internal exams will be conducted and an average of two will be considered as a part of continuous evaluation

7 Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular intervals. It carries a weightage of 5%.

8 Surprise tests/Quizzes will be conducted, which carry a 5% component of the overall evaluation.

Supplementary Resources:

1 https://nptel.ac.in/courses/105105162

2 https://onlinecourses.nptel.ac.in/noc23_ce76/preview

3 https://archive.nptel.ac.in/courses/105/106/105106113/

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