

Sankalchand Patel University
Faculty of Engineering and Technology
First Year Master of Technology in Civil Engineering
(Computer Aided Structural Analysis and Design)
In Effect from Academic Year 2023-24

Branch Name:	Civil Engineering (Computer Aided Structural Analysis & Design)
Semester/Year:	Semester II/ First Year
Subject Title:	Advanced Design of Steel Structures
Subject Code:	2ET2060203T
Pre-requisite:	Elementary Design of Steel Structures and Structural Analysis

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
4	3	1	0	4	24	60	16	40	00	00	00	00	100

Course Objective:

1. Structural steel is a material used for steel construction, which is formed with a specific shape following certain standards of chemical composition and strength.
2. The structural steel all over the world pre-dominates the construction scenario.
3. There has been an increasing demand for structural steel for construction purposes in India.
4. This material has been exhaustively used for the constructions of bridges, industrial structures, buildings and other structures all over the world because of its specific characteristics.
5. The course on Advanced Design of Steel Structures acquaints the students to analyze and design steel structures as per Indian Standard code of practice.

Subject Contents				
Sr. No	Topic	Total Hours	Weightage (%)	
1	Introduction: Design requirements and design process, brittle fracture under impact load, Dead loads, imposed loads, wind loads, earthquake load, earth or ground water load, indirect forces and combination of loads.	02	04	
2	Multi storey building: Introduction, loading, Analysis for gravity loads, computer analysis of rigid frame using software. Design of Built up beams, built up column, beam- column, connections beam to beam & beam to column.	08	20	
3	Cold form steel: Introduction, advantages of cold formed sections, load buckling, beam, axially compressed column, combined bending & compression, Tension members, Design on the basis of testing, empirical method & examples. truss bridges, gusseted connection	08	20	
4	Design of Steel Stacks: Introduction, Proportioning of stack, Codal provisions, Loads on Stacks, Load combinations, Stresses in Self-supporting stacks, Design procedure for self-supporting stacks, Guyed steel stacks.	08	20	
5	Design of industrial shed considering gravity and wind load	08	16	
6	Plastic Design: Plastic design of continuous beams, Rigid jointed portal frames.	08	20	

List of Tutorials:

Prepare minimum two designs suitably from topics of the course. The report shall of full analytical treatment, design procedure, references and all necessary drawings in form of net dimensioned sketches.

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Course Outcome:

At the end of this course, the student would be able

1. Analyses and design the industrial buildings,
2. Analysis and design of girder bridge, plate girder bridges, truss bridges and connections,
3. Compute the collapse loads, plastic moment capacities of continuous beams and portal frames,
4. Design of built up beams, built up column, beam- column, beam to beam and beam to column connections
5. Design of axially loaded column, combined bending and compression and tension members using cold formed steel section.

Open Ended Problems:

Apart from above tutorials/experiments a group of students has to undertake one open ended problem/design problem. Few examples of the same are given below.:

1. Modeling, analysis and design of an industrial building preferably selected from industry using open-source/commercial software.
2. Developing models of built up beams, built up column, beam-column, beam to beam & beam to column connections etc.

List of Reference Books

1. Design of Steel Structures – N. Subramanyan, Oxford.
2. Plastic Design of Low -rise frames, Horne, M.R., and Morris, L.J., Granada Publishing
3. Steel Structure -Design and Behaviour, Salmon, C.G., and Johnson, J.E. Harper and Row,
4. Design of Steel Structure - Duggal, Tata Mc Graw Hill.
5. Steel Design for Structural Engineers, Kuzamanovic,B.O. and Willems,N., Prentice Hall,
6. Cold-formed Steel Structures, Wie - Wen Yu., McGraw Hill Book Company, 1973.
7. Steel Structures, William McGuire, Prentice Hall, Inc., Englewood Cliffs, N.J.1986.
8. Guidelines to design cold form section by Tata Steel.
9. Design of Steel Structure- Shah and Gore, Structures Publishers, Pune
10. IS: 800, - Code of practice for General Construction in steel
11. IS: 875 - (Part I to V) - Code of practice for structural safety of building loading standards
12. IS: 226 - Structural steel (Standard Quality)
13. SP: 6(1) - Structural steel section
14. SP: 6(6) - Application of plastic theory in design of steel structures
15. IS 801: Code of Practice for Use of Cold Formed Light Gauge Steel Structural Members In General

List of Open Source Software/learning website:

<http://neptel.ac.in/>
[www.steel -insdag.org/](http://www.steel-insdag.org/)

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Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Analyses and design the industrial buildings,	L-3 and L-4
CLO2	Analysis and design of girder bridge, plate girder bridges, truss bridges and connections,	L-3 L-4 and L-5
CLO3	Compute the collapse loads, plastic moment capacities of continuous beams and portal frames,	L-5 and L6
CL04	Design of built up beams, built up column, beam- column, beam to beam and beam to column connections	L-5 and L-6
CL05	Design of axially loaded column, combined bending and compression and tension members using cold formed steel section.	L-4 L-5 and L6

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CLO1	M	M	M	M	M	M		M	M			M	M		M
CLO2	M	M	M	M	M	M		M	M			M	M		M
CLO3	M	M	M	M	H	M		M	M			H	M	H	M
CL04	M	M	M	M	H	M		M	M			M	M	M	M
CL05	M	M	M	M	H	M		M	M			M	M	M	M

H: High, M: Medium, L: Low