

Design and Drawing of Steel Structures

(Code : CEC-601)

Semester VI : Civil Engineering (Mumbai University)

*Strictly as per the New Revised Syllabus (Rev-2019 'C' Scheme) of Mumbai University
w.e.f. academic year 2021-2022 (As per Choice Based Credit and Grading System)*

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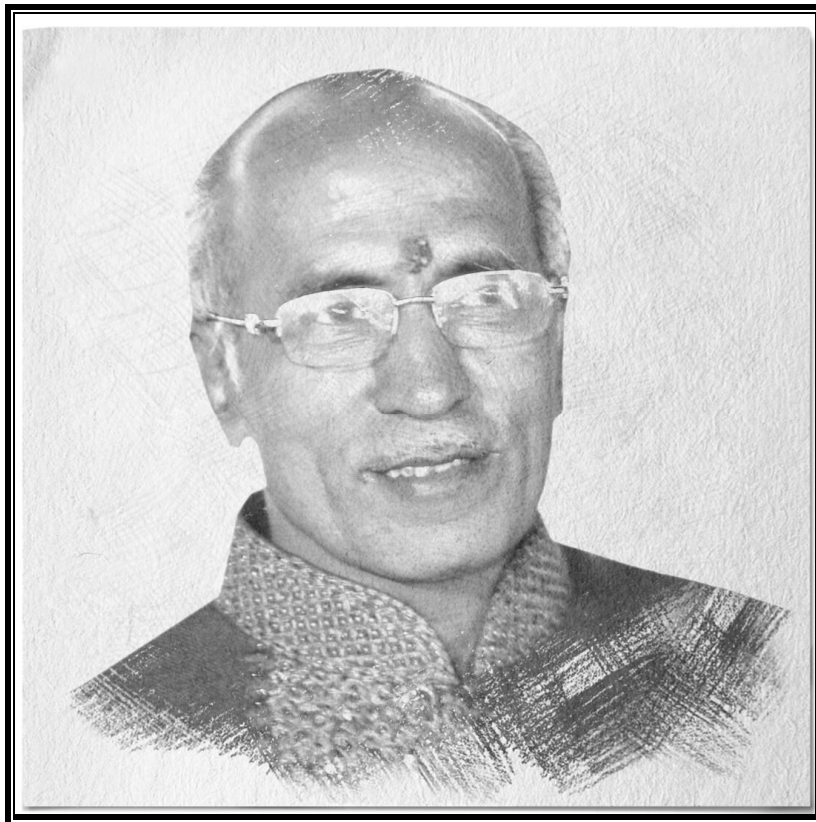
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We dedicate this Publication soulfully and wholeheartedly,
in loving memory of our beloved founder director,
Late Shri. Pradeepji Lalchandji Lunawat, who will
always be an inspiration, a positive force & strong support behind us.



“My work is my prayer to God”

- Lt. Shri. Pradeepji L. Lunawat

**Soulful Tribute and Gratitude for all Your
Sacrifices, Hardwork and 40 years of Strong Vision...**

Preface

My Dear Students,

*We are extremely happy to come out with this book on “**Design and Drawing of Steel Structures**” for you. We have divided the subject into small chapters so that the topics can be arranged and understood properly. The topics within the chapters have been arranged in a proper sequence to ensure smooth flow of the subject.*

A large number of solved examples have been included. So, we are sure that this book will cater all your needs for this subject.

*We present this book in the loving memory of **Late Shri Pradeepji Lunawat**, Our source of inspiration and a strong foundation of “**TechKnowledge Publications**”. He will always be remembered in our heart and motivate us to achieve our new milestone.*

*We are thankful to **Mr. Shital Bhandari, Shri. Arunoday Kumar and Shri. Chandroday Kumar** for the encouragement and support that they have extended. We are also thankful to **Seema Lunawat** for technology enhanced reading, E-books support and the staff members of TechKnowledge Publications for their efforts to make this book as good as it is.*

We have jointly made every possible efforts to eliminate all the errors in this book. However if you find any, please let us know, because that will help us to improve further.

We are also thankful to our family members and friends for patience and encouragement.

- Authors

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SYLLABUS

Semester VI		
Subject Code	Subject Name	Credits
CE-C 601	Design and Drawing of Steel Structures	03

Contact Hours			Credits Assigned			
Theory	Practical	Tutorial	Theory	Practical	Tutorial	Total
03	-	-	03	-	-	03

Theory					Term Work/Practical/Oral			Total
Internal Assessment			End sem. Exam	Duration of End Sem. Exam	Term Work	Pract.	Oral	
Test-I	Test-II	Average						
20	20	20	80	4 Hours	-	-	-	100

Rationale :

Steel structures are preferred due to their higher strength, speed of construction and aesthetic view. Civil Engineers must have knowledge of designing and detailing of steel structures to make structures safe and serviceable during its life span. I.S. code specifying the use of Limit State design philosophy for design of steel structures and its various components. This course is designed to provide basic knowledge of design and detailing of steel structures.

Objectives :

1. *To make students familiar with behavior of steel structure and their components under the action of various loads.*
2. *To train the students for effective use of IS codes, design tables and aids in analyzing and designing the steel structures by limit state method.*
3. *To help students design connections of steel members.*
4. *To equip students with aspects required for designing tension member, compression members and column bases.*
5. *To equip students with aspects required for designing of flexural members.*
6. *To aid students in designing steel trusses.*

Detailed Syllabus :

Module	Course Module / Contents		Periods
1	Introduction		03
	1.1	Types of steel structures, Properties of Structural Steel, Indian Standard Specifications and Sections, Advantages and limitations of WSM, permissible stresses in WSM. Introduction to Limit State Design, partial safety factors for load and resistance, design load combinations, section classification such as plastic, compact, semi-compact and slender.	
2	Design of Bolted And Welded Connections		06
	2.1	Design of bolted and welded connections for axial force, beam to beam and beam to column connections. Framed, stiffened and unstiffened seat connections, bracket connections.	
3	Design of Tension Members		04
	3.1	Introduction, types of tension members, net area calculation.	
	3.2	Design strength due to yielding, rupture and block shear.	
	3.3	Design of tension members with welded and bolted end connection using single angle section & double angle section.	
4	Design of Compression Members and Column Bases		11
	4.1	Introduction, types of compression members, classification of cross sections, types of buckling, effective length of column and slenderness ratio, buckling curves, design of compression members as struts using single angle sections & double angle section.	
	4.2	Design of axially loaded column using rolled steel sections, design of built-up column, laced and battened Columns.	
	4.3	Design of slab bases & gusseted base.	

Module	Course Module / Contents		Periods
5	Design of Flexural Members		11
	5.1	Design strength in bending, effective length, Lateral torsion buckling behavior of unrestrained beams, design of single rolled section with or without flange plates, design strength of laterally supported beams, low and high shear, design strength of laterally unsupported beams, web buckling, web crippling, shear lag effect and deflection.	
	5.2	Design of welded plate girder: proportioning of web and flanges, flange plate curtailment	
6	Design of Truss		04
	6.1	Design of determinate truss. Calculation of dead load, live load and wind load acting on truss. Load combinations and calculation of internal forces. Design and detailing of members. Support detailing. Design of angle section purlin.	
Total			39

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