



Kot Bhalwal, Jammu



Model Institute of Engineering
& Technology (Autonomous)
Course Handout

COURSE HANDOUT

DESIGN OF STEEL STRUCTURE (CE-602)

B.E. (Civil) - VI Semester

ACADEMIC YEAR (2024-25)

Mr. Abhishek Chandra

Asst. Professor

Department of CIVIL Engineering



Department of Civil Engineering

Model Institute of Engineering & Technology (Autonomous)

Kot Bhalwal, Jammu - 181122

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Dr. Arun K. Gupta Teaching-Learning Centre

Version 1.1



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Course Code	Course Name	Course Type	Cd	L	T	P	Marks		
							Sessional	Final Exam	Total
CE-602	Design of Steel Structures	PCC	4	3	1	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:

CO1	Explain the concept of plastic analysis of steel structures.
CO2	Describe the steel connections and tension members.
CO3	Analyze steel compression members.
CO4	Design flexural members.
CO5	Design plate girder and column bases.

Unit-I

Plastic analysis of steel structures - fundamentals, static and mechanism method of analysis, shape factor, classification of cross sections, As per IS 800-2007 plastic, compact, semi compact, slender sections, their characteristics including moment- rotation..

(12 Hours)

Unit-II

Types of bolts, load transfer mechanism, prying action, design of bolted and welded connections under axial and eccentric loadings. Tension Members: Design strength in gross section yielding, net section rupture and block shear, design of axially loaded tension members.

(8 Hours)

Unit-III

Types of buckling: Column buckling curves, imperfection factor, buckling curves for different cross sections, design of compression member, axially loaded compression members including angle section design, single and in pair, built up columns, design of lacing and battens.

(10 Hours)

Unit- IV

Design of beams: Simple and compound sections, main and subsidiary beams and their connections, laterally supported and unsupported beam design, web buckling, web crippling, lateral, torsional buckling.

(8 Hours)

Unit-V

Design of column bases - Slab base and gusseted base for axial compressive load, design of plate girder.

(8 Hours)

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Limit state Design of steel structures	S. K Duggal	Mc Graw Hill Publication	2 nd (2017)
2	Design Of Steel Structures	<u>KS Sai Ram</u>	Pearson Education India	2 nd (2015)



Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Design of steel structures	N. Subramanian	Oxford University press	2 nd (2018)
2	Design of steel structures	S. bhavikatti	I.K. international Pvt. Ltd	5 th (2017)
3	Design and analysis of connections in steel structures	Affredo Bracchin	Wiley publication	7 th (2018)

COURSE PLAN

Unit-I Introduction to Steel Structures

S.No	Topics	Recommended Books
1	Design philosophies: Introduction to limit stress method	Book 1, Ch.1
2	Introduction to IS code books, Types and Properties of structural steel, Advantages of steel as a structural material, I.S. rolled sections	Book 1, Ch.1
3	Types of loads acting on structure, Specifications of: IS 875 and IS 800.	Book 1, Ch.1
4	Fundamentals and static method of analysis, Mechanism method of analysis	Book 2, Ch.2
5	Shape factor of Circle, Triangle and diamond section	Book 2, Ch.2
6	Shape factor of various T and I section	Book 2, Ch.2
7	Plastic analysis: plastic and compact their characteristics including moment- rotation.	Book 2, Ch.2
8	Plastic analysis: semi compact and slender sections, their characteristics including moment- rotation.	Book 2, Ch.2

Unit-II Design of Connections

9	Bolted connections: Types of bolts	Book 2, Ch.2
10	Bolted connections: behavior bolted joints	Book 2, Ch.2
11	Bolted connections: strength of joint	Book 2, Ch.2
12	Bolted connections: efficiency of joint	Book 2, Ch.2
13	Welded connections: Types and properties of welds	Book 2, Ch.2
14	Welded connections: types of joints	Book 2, Ch.2
15	Welded connections: Design of connections beam to beam	Book 2, Ch.2
16	Welded connections: Design of beam to column	Book 2, Ch.2
17	Tension Members: Introduction	Book 2, Ch.3
18	Tension Members: Design strength in gross section yielding	Book 2, Ch.3
19	Tension Members: Net section rupture and block shear	Book 2, Ch.3
20	Tension Members: Design of axially loaded tension members	Book 2, Ch.3

Unit-III Design of Columns

21	Introduction to steel column	Book 2, Ch.4
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22	Buckling of steel column, choices of section	Book 2, Ch.4
23	Imperfection factor in column design, Buckling curves for different cross sections	Book 2, Ch.4
24	Design of compression member	Book 2, Ch.4
25	Design of built-up compression member	Book 2, Ch.4
26	Design of axially loaded compression members including angle section design	Book 2, Ch.4
27	Design of lacing system in column	Book 2, Ch.4
28	Connection Design of lacings in column and double lacing system	Book 2, Ch.4
29	Design of battens in column using bolt connection	Book 2, Ch.4
30	Design of battens in column using weld connection	Book 2, Ch.4
Unit-IV Design of Beams		
31	Introduction to steel Beam	Book 2, Ch.5
32	Design of Beams:-Failure modes of flexural members	Book 2, Ch.5
33	Design of Beams:-Laterally restrained Introduction	Book 2, Ch.5
34	Design of Beams:- Laterally restrained simply supported beams	Book 2, Ch.5
35	Introduction to unrestrained simply supported beams	Book 2, Ch.5
36	Design of Beams:- unrestrained simply supported beams	Book 2, Ch.5
37	Design for web buckling	Book 2, Ch.5
38	Design for web crippling	Book 2, Ch.5
39	Design for lateral buckling	Book 2, Ch.5
40	Design for torsional buckling	Book 2, Ch.5
Unit-V Design of Column Bases		
41	Introduction to Slab base	Book 2, Ch.9
42	Design of Slab base	Book 1, Ch.9
43	Introduction to Gusset base	Book 2, Ch.9
44	Design of Gusset base	Book 1, Ch.9
45	Eccentrically loaded base plate	Book 2, Ch.9
46	Introduction to plate girder	Book2, Ch. 11
47	Design of plate girder without stiffeners	Book2, Ch. 11
48	Design of plate girder with stiffeners	Book2, Ch. 11
49	Design of plate girder with welded connection	Book2, Ch. 11
50	Design of plate girder with bolted connection	Book2, Ch. 11

ADDITIONAL WEB RESOURCES

1.	NPTEL: Video lectures on Design of Steel Structures Lecture series by Prof. Damodar Maiti Department of Civil Engineering, IIT Kharagpur https://archive.nptel.ac.in/noc/courses/noc17/SEM2/noc17-ce21/
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GRADING AND ASSESSMENT

- **Sessional Test - I** : 10 marks
- **Sessional Test – II** : 10 marks
- **Assignment:** 20 marks
- **Attendance:** 10 marks





- **Final Examination:** 100 marks

COURSE POLICIES

- **Attendance:** Minimum 75% attendance is mandatory to appear in the final examination of the course.
- **Academic Integrity:** MIET's academic integrity policies apply. Plagiarism will not be tolerated.
- **Late Submissions:** Assignments and projects must be submitted by the specified timelines.

FACULTY INFORMATION

- **Office Hours**
Monday (12:05 PM - 12:55 PM)
Friday (12:05 PM - 12:55 PM)
- **Contact Information**
abhishek.civ@mietjammu.in