



DHANALAKSHMI SRINIVASAN ENGINEERING COLLEGE

(AUTONOMOUS)

(Approved by AICTE & Affiliated to Anna University, Chennai)

Re-Accredited by NAAC with 'A' Grade

Accredited by NBA for AERO, BME, CSE, ECE, EEE, IT & MECH.

PERAMBALUR-621212, TAMILNADU, INDIA.

Website: www.dsengg.ac.in



COURSE PLAN (2025-2026 EVEN SEMESTER)

Course Code/Name	U23CET62/ Design of Steel Structures			
Year/Section/Department	III /-/ Civil Engineering			
Credits Details	L: 3	T: 0	P: 0	C: 3
Total Contact Hours Required	45			

Syllabus:

UNIT I	SECTIONS AND JOINTS	No of periods: 9
Types of steel structures – Properties of rolled steel sections and Light gauge steel sections – Allowable Stresses as per IS code - Riveted and bolted connections – Failures of joints – Single and multiple riveted lap and butt joints under axial and eccentric loading – Strength of fillet and butt welded joints –Design of riveted and welded joints.		
UNIT II	TENSION MEMBERS	No of periods: 9
Types of sections – Net area – Net effective sections for angles and Tee in tension – Design of connections in tension members – Use of lug angles – Design of tension splice – Concept of shear lag.		
UNIT III	COMPRESSION MEMBERS	No of periods: 9
Types of compression members – Theory of columns – Basis of current code provision for compression member design – Slenderness ratio – Design of single section and compound section compression members Design of laced and battened type columns – Design of column bases Gusseted base.		
UNIT IV	BEAMS	No of periods: 9
Design of laterally supported and unsupported beams – Built up beams – Beams subjected to uniaxial and biaxial bending – Design of plate girders - Intermediate and bearing stiffeners – Flange and web splices.		
UNIT V	ROOF TRUSSES AND INDUSTRIAL STRUCTURES	No of periods: 9
Roof trusses – Roof and side coverings – Design of purlin and elements of truss; end bearing Design of gantry girder		

Objectives:

- Gain Knowledge of limit state design of steel structures and the design of connections.
- Be familiar with the design concepts of steel structural members subjected to tension.
- Understand the design concepts of the structural steel members subjected to compression.
- Be familiar with the design concepts of structural members subjected to bending .
- Be acquainted with the design concepts of the components of industrial structures.

Text Books:

T1: Bhavikatti.S.S, "Design of Steel Structures" By Limit State Method as per IS:800–2007,IK International Publishing House Pvt. Ltd., 2010.

T2: Duggal. S.K, "Design of Steel Structures", Tata McGraw Hill Education, 2009.

Reference Books:

R1: Gambhir. M.L., "Fundamentals of Structural Steel Design", McGraw Hill Education India Pvt.Ltd., 2013.

R2: Jayagopal L.S, and Tensing, “Design of Steel Structures” Vikas Publishing House Pvt. Ltd, India, 2016.

R3: Negi L.S, “Design of Steel Structures”, Tata McGraw Hill Publishing Pvt Ltd, New Delhi, 2007.

R4: Shiyekar M.R, “Limit State Design in Structural Steel”, Print ice Hall of India Pvt. Ltd, 2013.

R5: Subramanian N, “Design of Steel Structures”, Oxford University Press, New Delhi 2008.

Websites:

W1:https://en.wikipedia.org/wiki/Structural_steel [Structural steel sections]

W2:<https://www.slideshare.net/sarveshsureshraochikte/eccentric-connections-in-steel-structure->
[Eccentric connections]

W3:<https://theconstructor.org/structural-engg/lug-angles/4849/> [Use of lug angles]

W4:<https://www.steelconstruction.info/Trusses> [Roof trusses]

W5:<https://www.quora.com/What-are-the-best-books-for-steel-structure-designing> [Rivet connection]

Online Mode of Study (if Any):

OMS 1:<http://nptel.ac.in/courses/105102088/40>

OMS 2:<http://nptel.ac.in/courses/Webcourse-contents/IISc->

Course Plan:

Topic Number	Topic	Books to be referred	Page no	Teaching Aids	No of periods required	Cumulative periods
UNIT I – SECTIONS AND JOINTS						
1	Types of steel structures advantage and disadvantage of steel structures	T1	1-2	BB	1	1
2	Properties of rolled steel section and Light gauge steel section	T1	3-9	BB	1	2
3	Allowable Stresses as per IS code	T1	27-33	BB	1	3
4	Types of bolted connections Failures of joints ,Relative advantages and Limitations	T1	36-38	BB	1	4
5	A single and multiple bolt lap and butt joints under axial loading	T1,R4	45-50, 35-93	BB	1	5
6	A single and multiple bolt lap and butt joints under eccentric loading	T1,R4	71-77, 35-93	BB	1	6
7	Design of fillet and butt welded joints	T1,R4	95-119, 100-115	BB	1	7
8	A single and multiple riveted lap and butt joints under uniaxial and eccentric loading	R4	169-170	BB	2	9
Outcome of Unit I:						
CO1: Students should be able to apply the IS code practice for the design of steel structural elements, analyses and design tension members.						
UNIT II – TENSION MEMBERS						
9	Types of section	R4	121-122	BB	1	10
10	Net area, Net effective sections for angles and tee in tension	R4,R5	123-133, 7.4-7.8	BB	1	11
11	Design of connections in tension members	T1,R4	122-134, 134-140	BB	2	13
12	Design of tension splice	T1	140-142	BB	2	15
13	Use of lug angles	T1	143-148	BB	2	17
14	Concept of shear lag	R4	120-123	BB	1	18
Outcome of Unit II:						
CO2: Students should be able to illustrate design tension members and tension splice.						
UNIT III – COMPRESSION MEMBERS						

15	Types of compression members and sections	R4,T2	150-151, 810-811	BB	1	19
16	Behaviour and types of failures Short and slender columns	R4,T2	169-170, 59-66	BB	1	20
17	Basis of current codal provision for compression member design Effective Length	R4,R5	155-159, 11.2-11.6	BB	1	21
18	Slenderness ratio Column formula and column curves	R4,T2	151-152, 691-692	BB	1	22
19	Design of single section compression members	T1	165-167	BB	1	23
20	Design of compound section compression members	T1	165-167	BB	2	25
21	Design of column bases	R4, T1	169-170, 184-185	BB	1	26
22	Plate and Gusseted base	T1	189-192	BB	1	27

Outcome of Unit III:

CO3: Students should be able to design compression members and base plates.

UNIT IV – BEAMS

23	Design of laterally supported beams	R4,T1	150-151, 204-205	BB	1	28
24	Design of laterally unsupported beams	T1	224-225	BB	1	29
25	Built up beam	T1	220-223	BB	1	30
26	Beams subjected to uniaxial bending	R4,T1	151-152, 233-235	BB	1	31
27	Beams subjected to biaxial bending	T1	257-259	BB	1	32
28	Design of plate girders	T1	306-310	BB	1	33
29	Intermediate and bearing stiffeners	R3	316-320	BB	2	35
30	Flange and web splices.	T1	316-318	BB	1	36

Outcome of Unit IV:

CO4: Students will able to design various types of flexural members.

UNIT V – ROOF TRUSSES AND INDUSTRIAL STRUCTURES

31	Roof trusses	T1	361-362	BB	1	37
32	Roof and side coverings	T1	362-364	BB	1	38
33	Design of purlin	T1	233-234	BB	2	40
34	Elements of truss	T1	364-365	BB	1	41
35	End bearing	T1	382-390	BB	2	43
36	Design of gantry girder	T1	343-347	BB	2	45

Outcome of Unit V:

CO 5: Students should be able to design various members of roof truss.

Course Outcomes:

At the end of course

Students should be able to

CO1: Apply the IS code practice for the design of steel structural elements, analyses and design tension members.

CO2: Design tension members and tension splice.

CO3: Design compression members and base plates.

CO4: Design various types of flexural members

CO5: Design various members of roof truss.

Course Outcome Vs Program Outcome Mapping:

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2	3									2
CO 2	3	2	3									2
CO 3	3	2	3									2
CO 4	3	3	3									2
CO 5	3	3	3									2

Content beyond Syllabus:

- ISO 45001:2018, Occupational health and safety management systems

Internal Evaluation Components:

Web portal	Assignment	Components	Topic Number with Topic / Unit Details	Relevance to CO
Web portal 1	--	Assessment - I (60)	Unit I and II	CO 1 & CO2
	1	Assignment - Handwritten (20)	5. A single and multiple bolt lap and Butt joints under axial loading/ Unit I	CO 1
	2	Assignment - Poster Presentation / PPT (20)	13. Use of lug angles /Unit II	CO2
Web portal 2	--	Assessment - II (60)	Unit III and IV	CO3 & CO4
	3	Seminar (20)	19.Design of single section compression members / Unit III	CO3
	4	Case Study Report (20)	23. Design of laterally supported beams / Unit IV	CO4
Web portal 3	--	Model Exam (75)	Unit I to V	CO1 to CO6
	5	MCQ (15)	Unit I to V	CO1 to CO6
	-	Course Attendance (10)	--	--

Submission Details:

Phase 1(Before AT 1)		Phase 2 (Before AT 2)		Phase 3 (Before Model)
Assignment- Handwritten	Poster/PPT Presentation	Seminar	Case Study Report / Mini Project / Model Making	Technical Aptitude