SRI VENKATESWARA COLLEGE OF ENGINEERING

COURSE DELIVERY PLAN - THEORY

Department of Civil Engineering	
B.E/~~B.Tech/M.E/M.Tech~~ : Civil Engineering Regulation: 2018 PG Specialisation : NA Sub. Code / Sub. Name : **CE18503 – Structural Analysis** Unit I : **Indeterminate Frames**	LP: CE18503 Rev. No: 0 Date: 27.07.2022

Unit I Syllabus:

Degree of static and kinematic indeterminacies for plane frames - analysis of indeterminate pin-jointed frames and rigid frames (Degree of static indeterminacy up to two) - Consistent deformation method.

Objective: To make the students understand the basic concepts of static and kinematic Indeterminacies and hence make them to solve problems on pin jointed frames and rigid frames using consistent deformation method.

Session No *	Topics to be covered	Ref	Teaching Aids
1.	Introduction to Indeterminate structures, Degree of static Indeterminacy for Frames and Pin jointed frames	T2 Ch. 9 ,pp. 257 to 263	PPT & BB
2.	Problems on Pin jointed frames with external indeterminacy using Consistent Deformation	T2 Ch. 10 ,pp. 266 to 272	PPT & BB
3.	Problems on Pin jointed frames with external indeterminacy using Consistent Deformation method	T2 Ch. 10 ,pp. 266 to 272	PPT & BB
4.	Problems on Pin jointed frames with internal indeterminacy using Consistent Deformation method	T2 Ch. 10 ,pp. 272 to 283	PPT & BB
5.	Problems on Pin jointed frames with internal indeterminacy using Consistent Deformation method	T2 Ch. 10 ,pp. 272 to 283	PPT & BB
6.	Problems on Pin jointed frames with internal indeterminacy using Consistent Deformation	T2 Ch. 10 ,pp. 272 to 283	PPT & BB
7.	Problems on rigid frames using Consistent Deformation method	T2 Ch. 11 ,pp. 323 to 331	PPT & BB
8.	Problems on rigid frames using Consistent Deformation method	T2 Ch. 11 ,pp. 323 to 331	PPT & BB
9.	Problems on rigid frames using Consistent Deformation method	T2 Ch. 11 ,pp. 323 to 331	PPT & BB
10.	Problems on rigid frames using Consistent Deformation method	T2 Ch. 11 ,pp. 323 to 331	PPT & BB
11.	Problems on rigid frames using Consistent Deformation method	T2 Ch. 11 ,pp. 323 to 331	PPT & BB
12.	Revision of Unit I	T2 Chapter 9 & 10, pp.257 to 331	PPT & BB

Content beyond syllabus covered (if any): Nil

* Session duration: 50 minutes

Sub. Code / Sub. Name: **CE18503 – Structural Analysis**

Unit II : **Slope Deflection Method**

Unit II Syllabus :

Continuous beams and rigid frames (with and without sway) – Symmetry and antisymmetry– Support displacements

Objective: To impart the concepts of Slope deflection method and apply the same to analyse continuous beams and rigid frames

Session No *	Topics to be covered	Ref	Teaching Aids
13.	Introduction to Slope Deflection method	T1 Ch. 1 ,pp. 2	PPT & BB
14.	Assumptions, Sign Conventions, Derivation of Slope Deflection Equations	T1 Ch. 1 ,pp. 2 to 6	PPT & BB
15.	Problem on Continuous beam with a single unknown	T1 Ch. 1 ,pp. 7	PPT & BB
16.	Problems on: Continuous beam with 2 unknowns	T1 Ch. 1 ,pp. 9 to 16	PPT & BB
17.	Problem on Continuous beam with sinking of supports.	T1 Ch. 1 ,pp. 9 to 16	PPT & BB
18.	Problem on: Continuous beam with 3 unknowns	T1 Ch. 1 ,pp. 16 to 18	PPT & BB
19.	Problems on Frame without sway	T1 Ch. 1 ,pp. 20 to 29	PPT & BB
20.	Problems on Frame without sway	T1 Ch. 1 ,pp. 20 to 29	PPT & BB
21.	Problems on Frame with sway	T1 Ch. 1 ,pp. 29 to 39	PPT & BB
22.	Problems on Frame with sway	T1 Ch. 1 ,pp. 29 to 39	PPT & BB
23.	Problems on Frame with sway	T1 Ch. 1 ,pp. 29 to 39	PPT & BB
24.	Revision of Unit II	T1 Ch. 1 ,pp. 2 to 40	PPT & BB
Content beyond syllabus covered (if any): Nil			

* Session duration: 50 mins

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COURSE DELIVERY PLAN - THEORY

Sub. Code / Sub. Name: **CE18503 – Structural Analysis**

Unit III : **Moment Distribution method**

Unit III Syllabus :

Distribution and carryover of moments – Stiffness and carry over factors – Analysis of continuous beams – Plane rigid frames with and without sway.

Objective: To impart the concepts of Moment Distribution method and apply the same to analyse continuous beams and rigid frames

Session No *	Topics to be covered	Ref	Teaching Aids
25.	Introduction, Carry over moment, Carry over factor, Distribution factor, Stiffness factor	T1 Ch. 2 ,pp. 45 to 49	PPT & BB
26.	Problem on 2 span Continuous beam with end supports fixed	T1 Ch. 2 ,pp. 50 to 54	PPT & BB
27.	Problem on 3 span Continuous beam with end supports fixed and Problem on 2 span Continuous beam with one support fixed and the other support hinged	T1 Ch. 2 ,pp. 50 to 56	PPT & BB
28.	Problems on Continuous beams with Overhangs	T1 Ch. 2 ,pp. 57 to 60	PPT & BB
29.	Problem on 3 span Continuous beam with end supports hinged and Problem on Continuous beam with sinking of supports	T1 Ch. 2 ,pp. 60 to 64	PPT & BB
30.	Problem on Continuous beam with sinking of supports	T1 Ch. 2 ,pp. 60 to 64	PPT & BB
31.	Analysis of frames without sway - Introduction, Problem on Frames without sway	T1 Ch. 2 ,pp. 64 to 71	PPT & BB
32.	Problem on Frames without sway	T1 Ch. 2 ,pp. 64 to 71	PPT & BB
33.	Introduction to Analysis of frames with sway using Moment Distribution method	T1 Ch. 2 ,pp. 71 to 83	PPT & BB
34.	Problem on Analysis of frames with sway using Moment Distribution method	T1 Ch. 2 ,pp. 71 to 83	PPT & BB
35.	Problem on Analysis of frames with sway using Moment Distribution method	T1 Ch. 2 ,pp. 71 to 83	PPT & BB
36.	Revision of Unit II	T1 Ch. 2 ,pp. 45 to 86	PPT & BB
Content beyond syllabus covered (if any): Nil			

* Session duration: 50 mins

Sub. Code / Sub. Name: **CE18503 – Structural Analysis**

Unit IV : **Stiffness Matrix Method**

Unit IV Syllabus :

Element and global stiffness matrices – Analysis of continuous beams – Co-ordinate transformations – Rotation matrix – Transformations of stiffness matrices, load vectors and displacements vectors – Analysis of pin-jointed plane frames and rigid frames (with degree of freedom limited to two)

Objective: To make the students understand the concepts of stiffness matrix method and apply stiffness matrix method to analyse continuous beams, pin jointed frames and rigid frames.

Session No *	Topics to be covered	Ref	Teaching Aids
37.	Introduction to Stiffness Matrix method	T1 Ch. 11 ,pp. 324 T1 Ch.11, pp.350-351	PPT & BB
38.	Problem on Continuous Beams	T1 Ch.11, pp.351-359	PPT & BB
39.	Problem on Continuous Beams	T1 Ch.11, pp.351-359	PPT & BB
40.	Problem on Continuous Beams with settlement of supports	T1 Ch.11, pp.359-361	PPT & BB
41.	Problem on Frames without sway	T1 Ch.11, pp.361-366	PPT & BB
42.	Problem on Frames without sway	T1 Ch.11, pp.361-366	PPT & BB
43.	Problem on Frames with sway	T1 Ch.11, pp.366-369	PPT & BB
44.	Problem on Frames with sway	T1 Ch.11, pp.366-369	PPT & BB
45.	Analysis of Pin Jointed Frames	T1 Ch.11, pp.369-373	PPT & BB
46.	Analysis of Pin Jointed Frames	T1 Ch.11, pp.369-373	PPT & BB
47.	Analysis of Pin Jointed Frames	T1 Ch.11, pp.369-373	PPT & BB
48.	Revision of Unit IV	T1 Ch. 11 ,pp. 324 to 375	PPT & BB
Content beyond syllabus covered (if any): Nil			

* Session duration: 50 mins

Sub. Code / Sub. Name: **CE18503 – Structural Analysis**

Unit V : **Flexibility matrix method**

Unit V Syllabus :

Equilibrium and compatibility – Determinate vs Indeterminate structures – Indeterminacy - Primary structure – Compatibility conditions – Analysis of indeterminate pin-jointed plane frames, continuous beams, rigid jointed plane frames (with redundancy restricted to two)

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Objective: To impart the concepts of flexibility matrix method and make students to solve problems on continuous beams, pin jointed frames and rigid frames using flexibility matrix method.

Session No *	Topics to be covered	Ref	Teaching Aids
49.	Introduction to Flexibility Matrix method	T1 Ch. 11 ,pp. 324, 327, 329 R6 Ch. 5 ,pp. 186-188	PPT & BB
50.	Problem on Continuous Beams	T1 Ch. 11 ,pp. 330 to 335 R6 Ch. 5 ,pp. 188-191	PPT & BB
51.	Problem on Continuous Beams	T1 Ch. 11 ,pp. 330 to 335 R6 Ch. 5 ,pp. 188-191, 194-195	PPT & BB
52.	Problem on Continuous Beams with settlement of supports	T1 Ch. 11 ,pp. 335 to 340 R6 Ch. 5 ,pp. 191-194	PPT & BB
53.	Problems on Rigid frames	T1 Ch. 11 ,pp. 346 to 350 R6 Ch. 6 ,pp. 227-231	PPT & BB
54.	Problems on Rigid frames	T1 Ch. 11 ,pp. 346 to 350 R6 Ch. 6 ,pp. 227-231	PPT & BB
55.	Problems on Rigid frames	T1 Ch. 11 ,pp. 346 to 350 R6 Ch. 6 ,pp. 227-231	PPT & BB
56.	Problem on Frames with sway	T1 Ch. 11 ,pp. 346 to 350 R6 Ch. 6 ,pp. 227-231	PPT & BB
57.	Analysis of Pin Jointed Frames	T1 Ch. 11 ,pp. 342 to 345 R6 Ch. 7 ,pp. 319-337	PPT & BB
58.	Analysis of Pin Jointed Frames	T1 Ch. 11 ,pp. 342 to 345 R6 Ch. 7 ,pp. 319-337	PPT & BB
59.	Analysis of Pin Jointed Frames	T1 Ch. 11 ,pp. 342 to 345 R6 Ch. 7 ,pp. 319-337	PPT & BB
60.	Revision of Unit V	T1 Ch. 11 ,pp. 324 to 345 R6, Ch 5, 6 & 7	PPT & BB
Content beyond syllabus covered (if any): Analysis of Frames with redundancy 3			

* Session duration: 50 mins

COURSE OUTCOMES:

After successful completion of the course, students will be able to

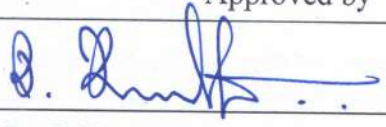
1. Analyze the pin-jointed and rigid jointed frames using consistent deformation method
2. Analyse the continuous beams and rigid frames by slope deflection method.
3. Apply the concept of moment distribution and analyse continuous beams and rigid frames with and without sway.
4. Apply the concept of matrix stiffness method to analyse continuous beams, pin jointed trusses and rigid plane frames.
5. Analyse the indeterminate pin jointed plane frames, continuous beams and rigid frames using matrix flexibility method.

TEXT BOOKS:

1. Bhavikatti, S.S, Structural Analysis II, Fourth Edition, Vikas Publishing House Pvt.Ltd.,NewDelhi-4, 2013
2. Bhavikatti, S.S, Structural Analysis I, Fourth Edition, Vikas Publishing House Pvt.Ltd.,NewDelhi-4, 2013
3. Bhavikatti, S.S, Matrix Method of Structural Analysis, I. K. International Publishing House Pvt.Ltd.,New Delhi-4, 2014.

REFERENCES:

1. Ghali.A, Nebille,A.M. and Brown,T.G. "Structural Analysis" A unified classical and Matrix approach" 6th edition. Spon Press, London and New York, 2013.
2. William Weaver, Jr and James M.Gere, Matrix analysis of framed structures, CBS Publishers & Distributors, Second Edition, Delhi, 2004
3. Reddy C.S., Basic Structural Analysis, Tata McGraw Hill Publishing Co. Ltd., Third Edition, 2010.
4. Punmia.B.C, Ashok Kumar Jain & Arun Kumar Jain, Theory of structures, Laxmi Publications, New Delhi, 2004.
5. Gambhir. M.L., "Fundamentals of Structural Mechanics and Analysis"., PHI Learning Pvt. Ltd., New Delhi, 2011.
6. Pandit G.S. & Gupta S.P. "Structural Analysis – A Matrix Approach", Tata McGraw Hill 2004.

	Prepared by	Approved by
Signature		
Name	Dr.R.Kumutha	Dr. R.Kumutha
Designation	Professor & Head/ Department of Civil Engineering	Professor & Head/ Department of Civil Engineering
Date	27.07.2022	27.07.2022
Remarks *: Same Lesson plan is followed for the Academic Year 2022-23		

* If the same lesson plan is followed in the subsequent semester/year it should be mentioned and signed by the Faculty and the HOD