



Model Institute of Engineering
& Technology (Autonomous)
Course Handout

Kot Bhalwal, Jammu

COURSE HANDOUT

B.E. (CE) – 3rd Semester

Civil-III SEMESTER

ACADEMIC YEAR (2024-25)

Ilyas Khaleel

Assistant Professor

Civil Engineering Department



Civil Engineering Department

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-302	Structural Analysis-I	PCC	5	4	1	0	50	100	150

COURSE OUTCOMES

At the end of the course the student will be able to:	
CO1	Evaluate different types of loading stresses and Draw S.F.D and B.M.D of different end conditions.
CO2	Understand the concepts of stresses, strains, Mohr's circle and analyze the deflection of beam.
CO3	Gain the knowledge to apply Maxwell, Castigliano theorem for different kind of columns under different conditions.
CO4	Analyze statically indeterminate structures and degree of redundancy.
CO5	Determine the deflection for determinate structures.

Unit-I

Shear force and bending: Simple stresses and strains, Hooks law, composite sections. Strain energy stresses due to different type of loadings, gradually & suddenly applied loads. Shear force and bending moment for simply supported cantilevers, fixed beam, and continuous beams. Stresses in beams, theory of simple bending, neutral axis, bending stress distribution, shear stresses, unsymmetrical bending & shear center. (9 Hours)

Unit-II

Deflection of beams and Mohr's circle: Deflection of beams, slope, deflection and radius of curvature, derivation of slope deflection formula, Macaulay's method, principal stresses and strains, Mohr's circle, graphical and analytical method, strain energy in terms of principal stresses, ellipse of strain, thin cylinders, circumferential & longitudinal stresses. (9 Hours)

Unit-III

Columns, struts and truss: Columns & struts, short & long columns Euler's theory, effective length, empirical formulae, eccentrically loaded columns, laterally loaded columns. Principle of virtual work, Maxwell's reciprocal theorem, first theorem of Castigliano, deflection of truss joints (determinate trusses) by Maxwell's method. (9 Hours)

Unit-IV

Statically indeterminate structures: Second theorem of Castigliano and its applications for beams and portal frames degree of redundancy of structures, forces in members of redundant trusses (single degree) (11 Hours)

Unit-V

Deflection of determinate structures: Conditions of equilibrium structures, cantilevers, compute deflections in simply supported beams using moment area method and conjugate beam method. (10 Hours)

Textbooks

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Design of Concrete Structures.	Nilson, A. H.	McGraw Hill,	13th (2004)
2.	Elementary Structural Analysis	Wibur & Nooris,	McGraw Hill.	9th (2015)



Reference Books

S.No	Name of the Books	Name of the Author	Publisher Name	Edition (Pub.Yr.)
1	Strength of Materials	Ramamrutham	Dhanpat Rai	16th (2011)
2	Strength of materials	S Timoshenko	CBS	3rd (2002)

COURSE PLAN

Unit-I Shear force and bending: Simple stresses and strains

S.No	Topics	Recommended Books
1	Simple stresses and strains	Book 1, Ch.1
2	Hooks law, composite sections.	Book 1, Ch.1
3	Strain energy, stresses due to different type of loadings, gradually & suddenly applied loads.	Book 1, Ch.1
4	Shear force and bending moment for simply supported cantilevers	Book 2, Ch.2
5	Shear force and bending moment for fixed beam, and continuous beams.	Book 2, Ch.2
6	Stresses in beams, theory of simple bending, neutral axis	Book 2, Ch.2
7	Bending stress distribution, shear stresses, unsymmetrical bending & shear Centre.	Book 2, Ch.2
Unit-II Deflection of beams and Mohr's circle		
8	Deflection of beams, slope, deflection and radius of curvature	Book 1, Ch.3
9	Derivation of slope deflection formula, Macaulay's method	Book 1, Ch.3
10	Principal stresses and strains, Mohr's circle, graphical and analytical method	Book 1, Ch.3
11	strain energy in terms of principal stresses, ellipse of strain	Book 2, Ch.4
12	Thin cylinders, circumferential & longitudinal stresses.	Book 2, Ch.4
Unit-III Columns, struts and truss		
13	Columns & struts, short & long columns Euler's theory, effective length, empirical formulae	Book 2, Ch.4
14	Eccentrically loaded columns, laterally loaded columns	Book 2, Ch.4
15	Principle of virtual work, Maxwell's reciprocal theorem	Book 2, Ch.4
16	First theorem of Castigliano, deflection of truss joints (determinate trusses) by Maxwell's method.	
Unit-IV Statically Indeterminate structures		
17	Second theorem of Castigliano and its applications for beams and portal frames	Book 2, Ch.5
18	Degree of redundancy of structures	Book 2, Ch.5
19	Forces in members of redundant trusses (single degree).	Book 2, Ch.5
Unit-V Deflection of determinate structures		
21	Conditions of equilibrium structures, cantilevers	Book 2, Ch.8
22	Compute deflections in simply supported beams using moment area method and conjugate beam method	Book 1, Ch.8



ADDITIONAL WEB RESOURCES

1.	Coursera: Fundamentals of Stress & Strain and Axial Loading https://www.coursera.org/learn/mechanics-1
2.	NPTEL: lectures on Structural Analysis-I-Web content and Notes https://archive.nptel.ac.in/courses/105/101/105101085/

GRADING AND ASSESSMENT

- **Sessional Test:** 20 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**
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