NIRMA UNIVERSITY

Institute:	**Institute of Technology**
Name of Programme:	**B Tech in Civil Engineering**
Course Code:	2CL103
Course Title:	**Structural Mechanics**
Course Type:	(☑Core/□Value Added Course/□Departmental Elective/ □Institute Elective/□University Elective/(□Open Elective Any other)
Year of Introduction:	2023-24

L	T	Practical Component				C
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Course Learning Outcomes (CLOs):

At the end of the course, the student will be able to –

1. examine statically indeterminate structures using classical methods under gravity and lateral loadings (BL4)
2. analyse statically indeterminate structures using matrix and approximate methods (BL4)
3. construct influence line diagrams for beam (BL3)
4. illustrate the behaviour of structural elements though experimentation. (BL2)

Syllabus: **Teaching hours: 30**

Unit	Syllabus	Teaching hours
Unit-I	**Classical Methods for Analysis of Indeterminate structures** Stability and determinacy of structures, propped cantilever beam, fixed beam, continuous beam and frames, slope-deflection method, moment distribution method	12
Unit-II	**Matrix Methods** Concept of flexibility and stiffness, analysis of indeterminate beams using flexibility method, analysis of indeterminate beams and frames using stiffness method	10
Unit-III	**Approximate Methods** Analysis of beam and frame subjected to gravity and lateral loading	05
Unit-IV	**Moving Loads and Influence Lines** Influence line diagrams for support reactions, shear force, bending moment etc., application of influence line diagrams for determinate beam	03

Self-Study:	The self-study contents will be declared at the commencement of the semester. Around 10% of the questions will be asked from self-study contents.
Suggested Readings/ References:	● Junnarkar, S. B., & Shah, H. J., *Mechanics of Structures, Vol. - I & II*, Charotar Publishing House. ● Hibbeler, R. C. *Structural Analysis*, Pearson. ● Kassimali, A. *Structural Analysis*, Cengage Learning India. ● Reddy, C. S. *Basic Structural Analysis*, Tata McGraw-Hill. ● Gere. J. M. & Weaver, W. *Matrix Analysis of Framed Structures*, C. B. S. Publishers & Distributors. ● Megson, T.H.G. *Structural and Stress Analysis*, Butterworth - Heinemann.
Suggested List of Experiments:	Laboratory work will be based on above syllabus with minimum 08 experiments/exercises to be incorporated.

Sr. No.	Name of Experiments/Exercises	Hours
1.	Maxwell's Reciprocal Theorem	02
2.	Principle of Superposition	02
3.	Beam Reaction Calculator	04
4.	Propped Cantilever Beam	04
5.	Deflection of Fixed Beam	04
6.	Continuous Beam	04
7.	Portal Frame subjected to lateral loading	04
8.	Computer application for analysis of Statically Determinate and Indeterminate Structure	06