

20CE4601A – ADVANCED STRUCTURAL ANALYSIS

Offering Branches	CE		
Course Category:	Professional Elective	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	20CE3503-Structural Analysis	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Analyze the three hinged and two hinged arches for concentrated and uniformly distributed loads	K4
CO2	Analyze the statically indeterminate frames using Moment distribution method and Kani's method	K4
CO3	Develop Influence line diagrams for all stress resultants in determinate beams and evaluate absolute SF, BM in the beams for moving loads.	K6
CO4	Analyze cables and suspension bridges	K4
CO5	Analyze the fixed and continuous beams using plastic analysis.	K4

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2			2	3							2	3
CO2	2	2			2	3							2	3
CO3	3	3			3	3							3	3
CO4	2	2			2	3							2	3
CO5	2	2			2	3							2	3
Avg.	2	2			2	3							2	3

1- Low

2-Medium

3-High

Course Content

UNIT-1	<p>Arches</p> <p>Three hinged Arch:</p> <p>Introduction, Analysis of three hinged arch, B.M, S.F and normal thrust in three-hinged arches, three hinged parabolic arch subjected to concentrated loads and uniformly distributed loads</p> <p>Two hinged Arch:</p> <p>Introduction, Analysis of two hinged arch, B.M, S.F and normal thrust in two-hinged arches, two hinged parabolic arch subjected to concentrated loads and uniformly distributed loads.</p>	CO1
UNIT-2	<p>Analysis of statically indeterminate frames</p> <p>Moment distribution method: Analysis of single-storey, single bay portal frames under gravity and lateral loads.</p> <p>Kani's method: Analysis of single-storey, single bay portal frames under gravity and lateral load</p>	CO2.
UNIT-3	<p>Influence Lines and Moving Loads</p> <p>Influence Lines: Definition of influence line for SF, Influence line for BM-load position for maximum SF at a section-Load position for maximum BM at a section single point load, uniformly distributed load longer than the span, uniformly distributed load shorter than the span</p>	CO3

	Moving Loads: Introduction, maximum SF and BM at a given section and absolute maximum S.F. and B.M due to single concentrated load U.D load longer than the span, U.D load shorter than the span, two point loads with fixed distance between them and several point loads.	
UNIT-4	Cables and Suspension Bridges Introduction, Analysis of Cables Under Concentrated Loads and Uniformly distributed Loads, Shape of Cable under Self-Weight, Stresses in suspended Wires due to Self-Weight, Anchorage of Suspension Cables, Stiffened Bridges, Bending moment and shear force for Three Hinged Stiffened Girders, Influence Lines for B.M and S.F in Three-Hinged Stiffening Girders, Suspension Bridges with Two-hinged Stiffening Girders.	CO4
UNIT-5	Plastic Analysis Introduction, Shape factor, Plastic Hinge, Collapse Mechanisms, Static and Kinetic Theorems, Methods of analysis, Application to Fixed and Continuous Beams.	CO5

Learning Resources

Text Books	<ol style="list-style-type: none"> 1. Pandit.G , Gupta.S and Gupta.R, Theory of Structures Vol.I & II, McGraw Hill Education, 2017. 2. V.N Vazirani and M.M Ratwani, Analysis of Structures Vol-II, Khanna Publishers, 2012
Reference Books	<ol style="list-style-type: none"> 1. C.K.Wang, Statically Indeterminate Structures, TataMcGrawHill, 2010. 2. R.C. Hibbeler, Structural Analysis, 6/e, Pearson, 2011.
e- Resources & other digital material	<ol style="list-style-type: none"> 1. https://nptel.ac.in/courses/105101085/25-31 2. https://onlinecourses.nptel.ac.in/noc17_ce25/preview 3. https://www.edx.org/learn/structural-engineering