AMITY UNIVERSITY

UTTAR PRADESH

Credit Units: 03

L	T	P/S	SW/FW	TOTAL CREDIT UNITS
3	-	-	-	3

Course Title: Structural Analysis - I

Course Level: UG

Course Code: CEE204

Course Objectives:

Structural Analysis, being the critical part in designing building and other structures, is important. Elastic theorems fixed and continuous beams, circular beams over simple support and theory of columns are covered in this course.

Pre-requisites: Engineering Mechanics

Course Contents/Syllabus:

	Weightage (%)
Module I	**15**
Deflection of Beams Differential equation of the elastic curve - slope and deflection of beams by method of successive integration - Macaulay's method - Moment area method - Conjugate beam method - Deflection due to shear.	
Module II	**35**
Elastic theorem and Energy Principle Strain energy and complementary energy - review of strain energy due to axial load - bending, shear and torsion - principle of superposition - principle of virtual work - Castigliano's theorem for deflection - theorem of complementary energy - Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - application of method of virtual work (unit load method) and strain energy method for determination of deflections of statically determinate beams - pin-joined trusses and rigid frames - temperature effects.	
Module III	**30**
Fixed and Continuous Beams Statically indeterminate structures - degree of static and kinematic indeterminacies – brief introduction to force and displacement methods - fixed and continuous beams - force method - analysis by consistent deformation method - application of moment area and conjugate beam methods for fixed beams - theorem of three moments for continuous beams - shear force and bending moment diagrams - deflection and support settlement.	
Module IV	**20**

Beams Curved in Plan Analysis of cantilever beam curved in plan - analysis of circular beams over simple supports **Theory of columns** Axial loading of short strut - long columns - Euler's Formula - Rankine Formula – Secant Formula - eccentric loading - direct and bending stresses – Buckling Load as an eigen value problem.	

Student Learning Outcomes: The students will be able to:

1. An understanding of the structural analysis procedures of all sorts of structural elements using elastic methods, energy theorems, force method, displacement method
2. Acquaintance to the stress distribution in the cables and suspension bridges and arches which would bring a holistic idea of entire structural analysis course.

Pedagogy for Course Delivery:

1. Class room teaching supported with field based examples.
2. Practical application based assignments.

Assessment/ Examination Scheme:

Theory L/T (%)	Lab/Practical/Studio (%)	TOTAL
100	0	100

Theory Assessment (L&T):

Continuous Assessment/Internal Assessment					End Term Examination
Components (Drop down)	**A**	**CT**	**S/V/Q**	**HA**	**EE**
Weightage (%)	5	10	8	7	70

CT: Class Test, HA: Home Assignment, S/V/Q: Seminar/Viva/Quiz, EE: End Semester Examination; Att: Attendance

Text & References:

- R. Vaidyanathan, P. Perumal, Comprehensive Structural Analysis Vol. I & II, Laxmi Publications, New Delhi
- Reddy C.S., Basic Structural Analysis, 2nd ed., Tata McGraw Hill, New Delhi (2004).

- Wang C.K., Statically Indeterminate Structures, McGraw Hill, New York, 1983.
- Wilbur J.B. & Norris C.H., Elementary Structural Analysis, McGraw Hill, 1960.
- Wang C.K., Intermediate Structural Analysis, McGraw Hill, 1983.
- Timoshenko S.P. & Young D.H., Theory of Structures, McGraw Hill, 1965.
- Kinney S.J., Indeterminate Structural Analysis, Oxford & IBH, 1985.
- Matheson J.A.L., Hyperstatic Structures, John Wiley and Sons, 1996.
- Negi L.S. & Jangid R.S, Structural Analysis, Tata McGraw Hill
- Rajasekaran S. & Sankarasubramanian G., Computational Structural Mechanics

Additional Reading NIL