CE2008D STRUCTURAL ANALYSIS - I

Pre-requisites: CE2001D Mechanics of Solids

L	T	P	C
3	0	0	3

Total hours: 39

Course Outcomes

CO1: To provide basic energy-based analysis techniques for analysing structures
CO2: To acquire knowledge regarding the behaviour of column under axial and eccentric loading
CO3: The graduates will be trained to use different analytical tools for understanding the behaviour of statically determinate and indeterminate structures using force method
CO4: To equip the students with comprehensive methods of structural analysis with emphasis on analysis of elementary structures and to attain ability to pursue higher studies in Civil Eng

Module 1 (14 hours)

Elastic theorems and energy principles: 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 - 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 2 (14 hours)

Theory of columns: Axial loading of short strut - long columns - differential equation of elastic curve – Euler's formula - eccentric loading - direct and bending stresses – buckling load as an eigenvalue problem.

Force method of analysis of indeterminate structures: Indeterminate structures - degree of static and kinematic indeterminacies - introduction to force and displacement methods

Fixed and continuous beams: Fixed and continuous beams - force method - analysis by consistent deformation method - shear force and bending moment diagrams - deflection and support settlement

Module 3 (11 hours)

Indeterminate Frames and Trusses: Deflection of rigid frames of different geometry by consistent deformation method - settlement effects - analysis of trusses by consistent deformation method - externally and internally redundant trusses - effects of support settlement and pre-strains.

References

1. Wilbur, J.B., Norris, C.H., and Utku, S., Elementary Structural Analysis, McGraw Hill, New York, 2006.
2. Wang, C.K., Intermediate Structural Analysis, McGraw Hill, New York,1989.
3. Timoshenko, S.P., and Young, D.H., Theory of Structures, McGraw Hill, New York, 1988.
4. Reddy, C.S., Basic Structural Analysis, Tata McGraw Hill, New Delhi, 2007.
5. Negi, L.S., and Jangid, R.S, Structural Analysis, Tata McGraw Hill, New Delhi, 2006.
6. Menon, D., Structural Analysis, Narosa publishers, New Delhi, 2008.
7. Hibbler, R.C., Structural Analysis, Pearson Education, India, 2006.

Evaluation Policy: Interim Test/Ass+Tutorials/End Sem Exam: 30/20/50