

Course Code	Course Name	L-T-P-Credits	Year of Introduction
CE202	STRUCTURAL ANALYSIS- I	3-1-0-4	2016

**Prerequisite:** CE201 Mechanics of Solids

**Course objectives:**

To equip the students with the comprehensive methods of structural analysis with emphasis on analysis of elementary structures.

**Syllabus :**

Truss analysis, Displacement response of statically determinate structural systems using energy methods, Principle of virtual work, Statically indeterminate structures, Strain Energy methods, Moving loads and influence lines, Statically determinate and indeterminate suspension bridges and arches.

**Course Outcomes:**

1. To study about analysis of trusses and to study displacement response of statically determinate structural systems using energy methods:
2. To study application of unit load method and strain energy method for determination of deflection of statically determinate beams, frames & pin jointed trusses
3. Analysis of Statically indeterminate structures using strain energy method and method of consistent deformation
4. To Study about moving loads and influence lines
5. To study about Statically determinate and indeterminate suspension bridges and arches

**Text Books:**

1. Gere and Timoshenko, Mechanics of materials, CBS. Publishers
2. Kenneth Leet, Chia M Uang & Anne M Gilbert., Fundamentals of Structural Analysis, McGraw Hill

**References:**

1. M.L. Gambhir, Fundamentals of structural Mechanics and analysis, Printice Hall India
2. Devdas Menon, Structural Analysis, Narosa Publications
3. Reddy C.S., Indeterminate Structural Analysis, Tata McGraw Hill
4. Kinney S., Indeterminate Structural Analysis, Oxford & IBH
5. Hibbeler., Structural Analysis, Pearson Education
6. Aslam Kassimali., Structural Analysis, Cenage Learning
7. Timoshenko S.P. & Young D.H., Theory of Structures, McGraw Hill
8. Harry H West & Louis F Geschwindner, Fundamentals of Structural Analysis, Wiley India Publisher
9. Wang C.K., Intermediate Structural Analysis, McGraw Hill
10. R.Vaidyanathan and P.Perumal, Comprehensive Structural Analysis Volume I & II, Laxmi Publications (P) Ltd

Module	Contents	Hours	End Sem.Exam Marks %
I	<b>TRUSS ANALYSIS:</b> Analysis of determinate truss- Methods of joints and sections <b>Displacement response of statically determinate structural systems using energy methods:</b> Elastic theorems and energy principles - strain energy due to axial load, bending moment, shear and torsion - strain energy method, Castigliano's method for deflection	8	15
II	<b>Principle of virtual work</b> – Unit load method-Betti's theorem - Maxwell's law of reciprocal deflections - principle of least work - application of unit load method and strain energy method for determination of deflection of statically determinate beams, frames - pin jointed trusses - temperature effects, lack of fit. <b>Statically indeterminate structures:</b> Degree of static and kinematic indeterminacies - force and displacement method	9	15
<b>FIRST INTERNAL EXAMINATION</b>			
III	<b>Strain Energy methods:</b> Analysis of beams, frames and trusses with internal and external redundancy - effect of prestrain, lack of fit, temperature changes, support settlement. <b>Method of Consistent deformations:</b> Analysis of beams frames and trusses with internal and external redundancy - effect of prestrain, lack of fit, temperature changes, support settlement.	9	15
IV	<b>Moving loads and influence lines.</b> Introduction to moving loads - concept of influence lines - influence lines for reaction, shear force and bending moment in simply supported beams and over hanging beams - influence lines for forces in beams and trusses analysis for and trusses analysis for different types of moving loads - single concentrated load - several concentrated loads uniformly distributed load shorter and longer than the span.	10	15
<b>SECOND INTERNAL EXAMINATION</b>			
V	<b>Statically determinate suspension bridges and arches</b> Analysis of forces in cables - temperature effects - suspension bridges with three hinged stiffening girders	10	20
VI	<b>Statically indeterminate suspension bridges and arches.-</b> theory of arches – Eddy's theorem - analysis of three hinged arches-suspension bridges with two hinged stiffening girders - analysis of two hinged arches - settlement and temperature effects.	10	20
<b>END SEMESTER EXAMINATION</b>			

## QUESTION PAPER PATTERN (End semester exam)

Maximum Marks: 100

Exam Duration: 3 Hrs

The question paper shall have three parts.

Part A -Module I & II : Answer 2 questions out of 3 questions (15 marks each)

Part B - Module III & IV: Answer 2 questions out of 3 questions (15 marks each)

Part C - Module V & VI: Answer 2 questions out of 3 questions (20 marks each)

**Note:** 1.Each part should uniformly cover the two modules in that part.

2. Each question can have a maximum of 4 subdivisions (a,b,c,d), if needed.

