

**CVX5443 Structural Analysis**

<b>Level</b>	5
<b>Course Code</b>	CVX5443
<b>Course Title</b>	Structural Analysis
<b>Credit value</b>	4
<b>Core/Optional</b>	Core (Civil Engineering)
<b>Course Aim/s</b>	To teach advanced topics of structural engineering
<b>Course Learning Outcomes (CLO):</b>	<p>At the completion of this course student will be able to:</p> <p>CLO1: Describe the fundamentals of theory of elasticity; Explain stress and strain as tensors; Develop Constitutive relationship; Idealize complex 3D problems as plane stress and plane strain problems; Formulate Airy's stress function and its practical applications.</p> <p>CLO2: Describe experimental stress measurement techniques; Theorize the use of electrical resistance strain gauges and practical applications.</p> <p>CLO3: Describe statical and kinematic indeterminacy of structures; Interpret the structural stability of structures.</p> <p>CLO4: Perform stiffness and displacement methods of structural analysis for indeterminate structures.</p> <p>CLO5: Perform structural analysis of plates and shells under static loadings. Interpret the results to design new structures.</p> <p>CLO6: Formulate plastic moment capacity of beams and frames; Determine collapse load of beams and frame structures. Perform structural design using plastic theory. Discuss advances in Structural Analysis</p>
<b>Content (Main topics, sub topics)</b>	<p><b>Outline Syllabus:</b></p> <p>Unit 1: Theory of Elasticity and Experimental Stress Measurement            Session 01: Introduction to theory of Elasticity            Session 02: Analysis of Stress            Session 03: Analysis of Strain            Session 04: Consecutive Relationships            Session 05: Two Dimensional Problems in Rectangular Coordinates            Session 06: Application of Airy Function in Rectangular Coordinates            Session 07: Two Dimensional Problems in Polar Coordinates            Session 08: Experimental Stress Analysis            Session 09: Electrical Resistance Strain Gauges</p> <p>Unit 2: Advanced Topics in Structural Analysis            Session 10: Statical and Kinematic Indeterminacy of Structures            Session 11: Force Method of Structural Analysis I            Session 12: Force Method of Structural Analysis II            Session 13: Displacement Method of Structural Analysis I            Session 14: Displacement Method of Structural Analysis II            Session 15: Theory of Thin Plates            Session 16: Theory of Thin Plates in Polar Coordinate System            Session 17: Membrane Theory of Thin Shells            Session 18: Further Applications in Membrane Theory            Session 19: Plastic Hinge Analysis            Session 20: Failure Theories            Session 21: Yield Criteria for Metals</p> <p>Unit 3: Topics in Material Engineering            Session 22: Metal Fatigue            Session 23: Metal Fatigue of Bridges            Session 24: Advances in Fatigue            Session 25: Corrosion and Engineering Structures            Session 26: Fracture Mechanics</p>

Session 27:Introduction to Material Science

Session 28:Cristal Structures

Session 29:Introduction to Dynamics

Session 30:Structural Reliability

**Laboratory work**

1. Perform laboratory tests to determine internal forces in statically indeterminate structures employing with complex geometries.
2. Perform laboratory experiment on determination of stress and strains using electrical resistance strain gauges.