CVX3442 Strength of Materials

Level	3
Course Code	CVX3442
Course Title	Strength of Materials
Credit value	4
Core/Optional	Core (Civil Engineering)
Course Aim/s	To provide knowledge of the concepts of Engineering Mechanics of materials, behavior of materials and structures under applied loads with respect to Engineering Design and Analysis.
Course Learning Outcomes (CLO):	At the completion of this course student will be able to: CLO1: Identify basics engineering properties based on the structural requirement of the element. [Uni-structural] CLO2: Perform standard laboratory to determine deflection and stress-strain criteria of the beams. [Multi-structural] CLO3: Describes the concept of stress-strain behaviour of the rod and assess strength capacity of the elements. [Multi-structural] CLO4: Formulate the relationship to predict the critical loading combination for specific elements; interpret element behaviour based on the engineering parameters obtained. [Relational] CLO5: Discuss time dependant stress-strain behaviour of material and energy storage; satisfy the basic design requirement to meet structural stability. [Relational]
Content (Main topics, sub topics)	**Outline Syllabus:** Unit 1: Stress and Strain Session 01: Introduction to basic concepts of the stress and principles Session 02: Introduction to basic concepts of the strain and principles Session 03: Relationship between the stress and strain Session 04: Allowable stress of materials Unit 2: Compound Bars Session 05: Axial stress and thermal stress of the compound bars Unit 3: Thin Cylinders and Shells Session 06: Different type of stresses and built in the shells Session 07: Strains in cylinders and shells Unit 4: Shear Force and Bending Moment Diagrams Session 08: Different type loads Session 09: Different type of load acting on the beam Session 10: Beams based on the support condition Unit 5: Shear Force and Bending Moment Diagrams Session 11: Stress and bending moment Session 12: Composite beam section and axial loads Unit 6: Shear Force and Bending Moment Diagrams Session 13: Internal forces build up in the beams Session 14: Complex beam section to determine the stress Unit 7: Compound Stress at a Point Session 15: tension, compression and pure shear and direct stresses Session 16: Mohr's circle Unit 8: Compound Strain Session 17: Two and three dimensional strain system Session 18: Mohr circle and stress circle Session 19: Strain rosette for 45,60 degree Unit 9: Strain Energy Session 20:Strain energy Session 21: Castiglioni's theory Unit 10: Torsion

	Session 22: Torsional strain energy in beams Session 23: Torsional application in parallel and series Session 24: Combine torsion, axial load, bending moments Unit 11: Beam Deflection Session 25: Analysis the beam using the double integrate method Session 26: Analysis the beam using the moment area method. Session 27: deflection and shear deflection in continues beam Unit 12: Springs Session 28: Springs subjected to axial loads, torques Session 29: Limitation of the theory and behaviour of spherical springs Session 30: Torsional application in parallel and series Unit 13: Struts Session 30: Euler formula using torsion formula Session 31: Failure of intermediate columns using Rankine-Godman Formula **Laboratory work:** 1. Rigid Beam Experiment 2. Buckling of Struts 3. Torsion of Circular Bars 4. Variation of Deflection of a Simply Supported Beam 5. Verification of the Theory of Pure Bending Tensile Strength of Metals.