

CE232	Strength of Materials	Class: 2nd	Mandatory
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Teaching scheme: 3 hours lecture and 1 hour tutorial per week Credits: 6

Course description:

This subject covers the fundamentals of mechanics of materials which is a study of the relationship between the external loads on a body and the intensity of the internal loads within the body.

Objective

- *This subject provides an overview of the concepts of the internal forces generated in the solids due to the application of loads and their effects (deformation).*
- *Also it gives an introduction to the structural design.*

Specific learning outcome:

The learner will be able to solve a variety of problem subjected to static loads concerning their elastic deformation.

<u>No.</u>	<u>Topic</u>	<u>Hours</u>
1.	Fundamental principles of mechanics Concept of forces, forces, units of forces (SI units). Moment of force. Condition of equilibrium.	4
2.	Forces and moments Shear force and bending moment diagrams. Differential equilibrium relationship.	16
3.	Stresses Concept of stresses. Stresses due to axial stresses. Average shearing stresses. Thin – walled pressure vessels.	12
4.	Stresses in beams. Bending stresses. Shearing stresses. Composite beams , concrete beams .	16
5.	Strain. Definition. Hook's low. Poisson's ratio. Thermal strain. Stress – strain diagrams. Linear relation between E, G and ν .	16
6.	Transformation of stress and strain Equation for the transformation of plane stresses Principal stresses.	16

- Mohr's circle of stress.
Concrete beams.
7. Torsion 16
The torsion formula for the solid circular shaft.
Design of circular member in torsion.
Angle of twist of circular member in torsion.
Thin – walled hollow member.
Solid non – circular sections.
8. Deflection of beams 16
Governing differential equation for deflection of elastic beams.
Double integration method.
Moment area method.
9. Columns 8
Nature of the beam column problems.
Euler buckling load.

Grading

No.	Assessment	Number	% each	% total	Dates
1	Homework (HW), Quizzes(Q)			10	
2	TEST 1	1	7.5 %	7.5	
3	TEST 2	1	7.5 %	7.5	
4	TEST 3	1	7.5 %	7.5	
5	TEST 4	1	7.5 %	7.5	
6	Final Exam (F)	1	60 %	60	
	Overall Total			100	

References:

Singer “strength of materials” 3rd edition,1980 and 4th edition
R.C.Hibbeler “ Mechanics of Materials” 8th edition,2008
R.J.Hearn “Mechanics of Materials “ 3rd edition,1997
Textbook Popov “ Engineering Mechanics of Solids”,1990.