



## Strength of Materials II

**Course code:** 28263  
**Credits:** 2  
**Course Type:** Theoretical  
**Prerequisites:** Strength of Materials I  
**Course Length:** 34 hours

### Outlines:

#### 1- A Review on Strength of Materials I

#### 2- Bending of Curved Beams

#### 3- Determination of Deflection in Determinate Beams

*I- Integration Method*

*II- Singular Functions (Macaulay Method)*

*III- Moment-Area*

*IV- Superposition*

#### 4- Determination of Deflection in Indeterminate Beams

*I- Integration Method*

*II- Singular Functions (Macaulay Method)*

*III- Moment-Area*

*IV- Superposition*

*V- Three Moment Method*

#### 5- Energy Methods

Concept of elastic energy and external work, definition of energy relation for different loading types, virtual work principle, reciprocal deformations principle, deformation energy, complementary energy, potential energy method, unit load method, Castigliano's theorems and their use in statically indeterminate problems (trusses, beams, frames)

#### 6- Stability of Columns

Stability concept in equilibrium, stability of columns theorem, Euler critical load for different boundary conditions and its limitation, stability under eccentric loads, Secant formula, beams with lateral supports, experimental relations for columns buckling, beam-columns, design of columns using empirical relations (AISC formulas)

### References:

1. Engineering Mechanics of Solids (2<sup>nd</sup> Ed.), E.P. Popov, 1998
2. Mechanics of Materials (3<sup>rd</sup> Ed.) F.P. Beer, E.R. Johnston & J.T. Dewolf, 2002