

# Strength of Materials – I

S.E. Sem. III [MARINE]

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## EVALUATION SYSTEM

	Time	Marks
<b>Theory Exam</b>	3 Hrs.	100
<b>Practical Exam</b>	–	–
<b>Oral Exam</b>	–	–
<b>Term Work</b>	–	25

## SYLLABUS

### 1. Simple Stresses and Strains

Stress, Strain, Modulus of rigidity, bulk modulus, yield stress, ultimate, factor of safety, shear stresses, Poisson ratio, bars of varying cross sections, composite sections, temperature stresses

#### Principal Stresses

General equations for transformation of stresses, principal planes and Principal Stresses, maximum stress, determination of principal stresses using Mohr's Circle, maximum principal stress and maximum shear stress theory of failure.

### 2. Shear force and bending moment in beams

Shear force and bending moment diagrams for statically determinate beams, including beams with internal hinges for different types of loadings, relationships between rate of loading, shear force and bending moment.

### 3. Simple theory of bending

Flexural formula for straight beams, Moment of Inertia, Product of inertia and Polar moment of Inertia of plane areas, principal axes of inertia, moments of inertia about principal axes, transfer theorem, simple problem involving application of flexural formula, section modulus, moment of resistance of a section, flexural stresses in beams of uniform strength.

#### Combined bending and direct stresses

Application to members subjected to eccentric loads, core of a section, Applied problems.

### 4. Shear Stresses in Beams

Distribution of Shear Stress across plane section used commonly for structural purposes, shear connectors.

### 5. Torsion

Twisting of circular shafts – solid and hollow, stiffness and strength, power and torque relation, Shafts with linear and Compound Shafts, Partial hollow Shafts Torsion applied to closed coil springs, springs with axial load calculations for mean diameter of springs, wire diameter and number of coils.

### 6. Thin Cylinders

Stresses and strains in thin cylinders and spheres due to internal pressure.

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**References :**

1. Strength of Materials by (*S. Ramamrutham*) – Dhanpat Rai Publication
2. Strength of Materials by (*R.K. Rajput*) – S. Chand Publication
3. Strength of Materials by (*R. S. Khurmi*) – S. Chand Publication
4. Strength of Materials by (*Timoshenko & Young*) – Tata McGraw Hill
5. Mechanics of Materials (*E.P. Poppov*) – Prentice Hall
6. Mechanics of Materials (*James Gere*) – Thomson Learning
7. Mechanics of Materials (*S. B. Junnarkar*) – Charotar Publishers
8. Mechanics of Materials (*Ferdinand P. Beer, E. Russell Johnston, Jr. ohn T. DeWolf*) – McGraw Hill International.

