Strength of Materials

S.E. Sem. III [CIVIL/CONE]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	25
Term Work	–	25

SYLLABUS

1. **Shear force and bending moment**
   Axial force, shear force and bending moment diagrams for statically determine beams including beams with internal hinges for different types of loading, relationships between rate of loading, shear force and bending moment.

2. **Stress and Strain**
   Stress, Strain, Modulus of elasticity (E), Modulus of Rigidity (G), Bulk Modulus (K), yield stress, ultimate stress, factor of safety, shear stress, Poisson's ratio. Relationship between E, G and K. Bars of varying sections, composite sections, temperature stresses.

3. **Simple theory of bending :**
   Flexure formula for straight beams, moment of inertia, product of inertia and polar moment of inertia of plane areas, principal axes of inertia, moment of inertia about principal axes, transfer theorem, simple problems involving applications of flexure formula, section modulus, moment of resistance of section of flitched beams.

4. **Shear stress in beams**
   Distribution of shear stress across plane sections used commonly for structural purposes, shear connectors. Shear stress and force in beams of thin walled open cross sections, shear centre of thin walled sections such as angle, tee, channel and I sections.

5. **Simple theory of torsion**
   Torsion of circular shafts – solid and hollow, stresses in shaft when transmitting power, close coiled helical springs under axial load.

6. **Bending moment combined with axial loads**
   Application to members subjected to eccentric loads, core of a section. Problems on chimneys, retaining walls etc. involving lateral loads,

7. **Principal stresses**
   General equations for transformation of stress, principal planes and principal stresses, maximum shear stress, determination using Mohr's circle, principle stresses in shafts subjected to torsion, bending and axial thrust, concept of equivalent torsional and bending moments.

8. **Rivets and welds**
   Axially and eccentrically loaded riveted and welded connections.

9. **Thin cylindrical and spherical shells**
   Stresses and strains in thin cylindrical and spherical shells under internal pressure.

References :

1. Mechanics of Materials (*E.P. Popov*) – Prentice Hall of India Pvt. Ltd.
2. Mechanics of Materials (*Timosnenko & Gere*) – Prentice Hall of India Pvt. Ltd.
3. Mechanics of Structures, Vol. I (S.*B. Junnarkar*) – Charotar Publishers
4. Mechanics of Materials (*James M. Gere*) – Brooks/Cole
5. Strength of Materials (*G.H. Ryder*), MacMillan.
6. Mechanics of Materials (*Pytel & Singer*) – McGraw Hill, New Delhi
7. Strength of Materials (*William A. Nash*), Schaum's Outline Seriesout line service, McGraw Hill Book Co.
8. Mechanics of Materials (*Beer & Johnson*) – Tata McGraw Hill, New Delhi
9. Strength of Materials (*Subramanian*), Oxford University Press
10. Strength of Materials (*R.K.Rajput*), S. Chand.

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