Topics and Chapter Sections Covered for Test 1

Related homework: 1 – 3

1  Chapter 1 - Introduction to Design

Sections covered:  All

Topics Covered: The following topics are included:

1. Factor of safety
2. Statics
3. Stress
4. Strain

This material is tested implicitly, but not explicitly. This means that you need to know it, but it won’t be specifically discussed it in class.

2  Chapter 2 - Materials

Sections covered:  2.1 – 2.7, 2.12 – 2.13; Handout 1

Topics Covered: The following topics are included:

1. Definition of stresses and stress tensor (matrix)
2. Definition of ‘0th’ and ‘1st’ order stress at a point (stress cube).
3. Equality of certain shear stresses
4. Derivation of equilibrium, application of stress boundary conditions
5. Definition of normal and shear strains
6. Hooke’s Law and Generalized Hooke’s Law (normal stress-strain relationships)
7. Shear stress-strain relationships, shear modulus
8. General constitutive relationships, with E, ν and G as well as with dilation and Lamé constants.
9. Thermal strain
10. Tonti diagrams
11. Derivation of bar displacement equations using equilibrium, constitutive and kinematic conditions.

3  Chapter 3 - Stress and Strain

Sections covered:  3.1 – 3.4, 3.17 – 3.18

Topics Covered: The following topics are included:

1. Assumptions - St. Venant’s Principle, plane sections remain plane, etc.
2. Axial loading
3. Direct shear and bearing stress
4. Truss member and pin design problem.
5. Thin walled pressure vessels (cylindrical and spherical)