

本試題是否可以使用計算機: 可使用, 不可使用 (請命題老師勾選)

1. Plot the stress-strain diagram of a rigid material. (5%) What is the Young's modulus of this material? (5%)
2. What is the definition of the shear strain γ_{xy} ? (5%)
3. What are the axial rigidity, torsional rigidity, and the flexural rigidity? (15%)
4. What is the effective or von-Mises stress in three-dimensional stress state? (5%)
What are the assumptions when this stress is derived? (5%)
5. Propose five methods to increase the buckling load of a column. (10%)
6. Plot the stress strain diagram of a elastic-perfectly plastic material? (5%)
7. What is the statically indeterminate structure? (5%)
8. Write the expressions of Generalized Hooke's Law in Cartesian coordinate system for two-dimensional problems. (15%)
9. The flexural formula $\sigma = My/I$ is derived based on the assumption that the cross section normal to the neutral plane remains plane after deformation when the beam is subjected to pure bending. However, the cross section will be distorted if the shear force exists. Therefore, can we use the flexural formula to compute the bending stress for a beam when the shear force is not equal to zero? Why? (10%)
10. What is the product moment of inertia I_{xy} of a rectangular cross section? (5%)
Here x-axis and y-axis are the principal axes of the cross section.
11. What is the assumption when we apply the superposition principle to solve the beam problems? (5%)
12. For a linear elastic material, write the expression of strain energy density of a volume element ΔV subjected to uni-axial stress σ . Assume the Young's modulus is E. (5%)