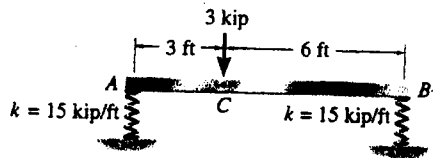


本試題是否可以使用計算機： 可使用， 不可使用（請命題老師勾選）

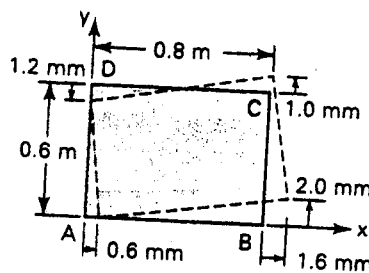
考試日期：0301，節次：1

1. (1) Define plane stress (x-y plane) problem and plane strain (x-y plane) problem. (10%)
 (2) Derive the elastic constitutive relations for plane stress (x-y plane) problem and plane strain (x-y plane) problem. (20%)

2. The steel bar is supported by two springs at its ends A and B. Each spring has a stiffness of $k = 15 \text{ kip/ft}$ and is originally unstretched. The bar is loaded with a force of 3 kip at point C. Neglect the weight of the bar and take $E_{st} = 29 \times 10^3 \text{ ksi}$, $I = 12 \text{ in}^4$. (1) Determine the vertical displacement of point C induced by rigid body motion. (10%) (2) Determine the total vertical displacement of point C. (10%)



3. A 0.8-m by 0.6-m rectangle ABCD is drawn on a thin plate prior to loading. Subsequent to loading, the deformed geometry is shown by the dash lines. The material's modulus of elasticity $E = 210 \text{ GPa}$, and Poisson's ratio $\nu = 0.3$. (1) Determine the components of plane strain at point A. (10%) (2) Determine the in-plane principal strains at point A and the directions in which they act. (10%) (3) Determine the principal stresses at point A. (10%)



4. The boom of a crane is constructed of steel, $E = 210 \text{ GPa}$; the yield point stress is 210 MPa. The cross section is rectangular with a depth of 100 mm and a thickness of 50 mm. Determine the buckling load of the column W_{cr} . (20%)

