

國立成功大學

112學年度碩士班招生考試試題

編 號： 119

系 所： 工程科學系

科 目： 材料力學

日 期： 0207

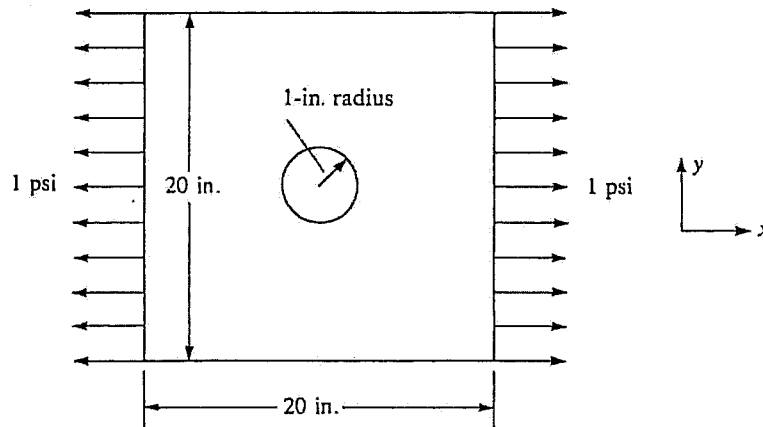
節 次： 第 2 節

備 註： 可使用計算機

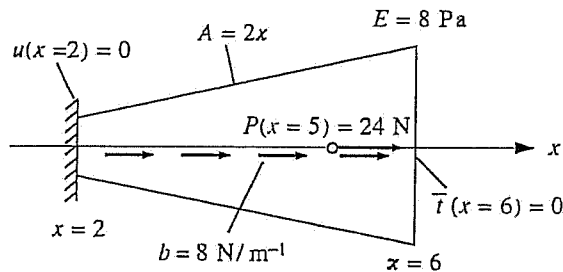
※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

Total 100%

1. (20%) Consider a simple two-dimensional elasticity problem with a square sheet of a circular hole subjected to a tensile loading. We can take the advantage of the symmetric conditions on a quarter (1/4) model to obtain the desirable stress analysis results.
  - (a) (10%) Describe all the boundary conditions on the quarter model.
  - (b) (10%) Draw schematically the boundary conditions on the quarter model.

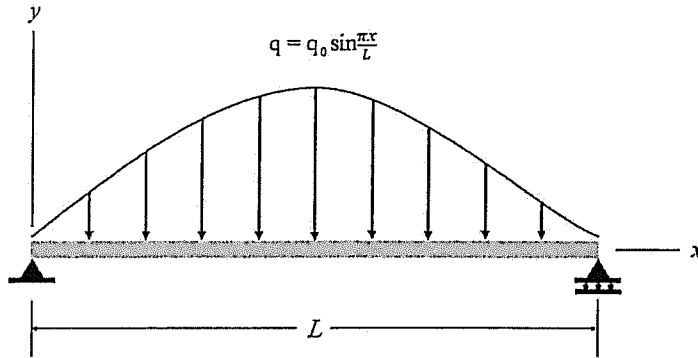


2. (30%) Consider a tapered elastic bar given below. The bar is made by a linear elastic and isotropic material.

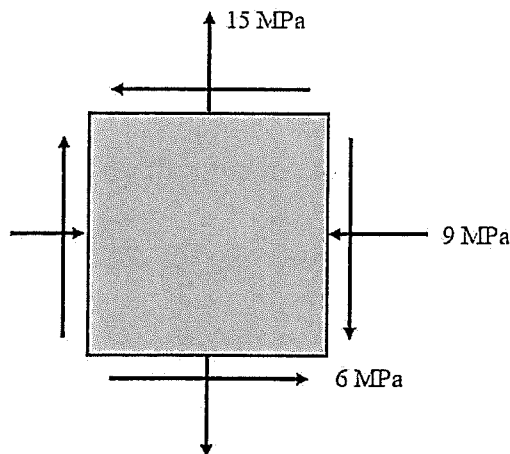


- (a) Please write down the govern equation (5%)
- (b) Please write down all the boundary conditions (including Neumann boundary conditions) (5%)
- (c) Please solve govern equation you wrote in (a) to obtain the general solution (15%)
- (d) Please find out the exact solution. (5%)

3. (25%) A simple beam subjected to a nonuniform distributed load  $p = p_0 \sin\left(\frac{\pi x}{L}\right)$ . The bending rigidity is  $EI$ .



- Please write down the govern equation (5%)
  - Please write down all the boundary conditions (including Neumann boundary conditions) (5%)
  - Please write down the deflection equation. (9%)
  - What is the maximum value of deflection and where? (6%)
4. (25%) The state of plane stress at a material point is given below.



- Draw the Mohr's circle according to the given stress state. (10%)
- Represent the stress state on an element oriented 30 degrees **counterclockwise** from the given position. (6%)
- Determine the principal stresses, the maximum in-plane shear stress and average normal stress. (9%)