

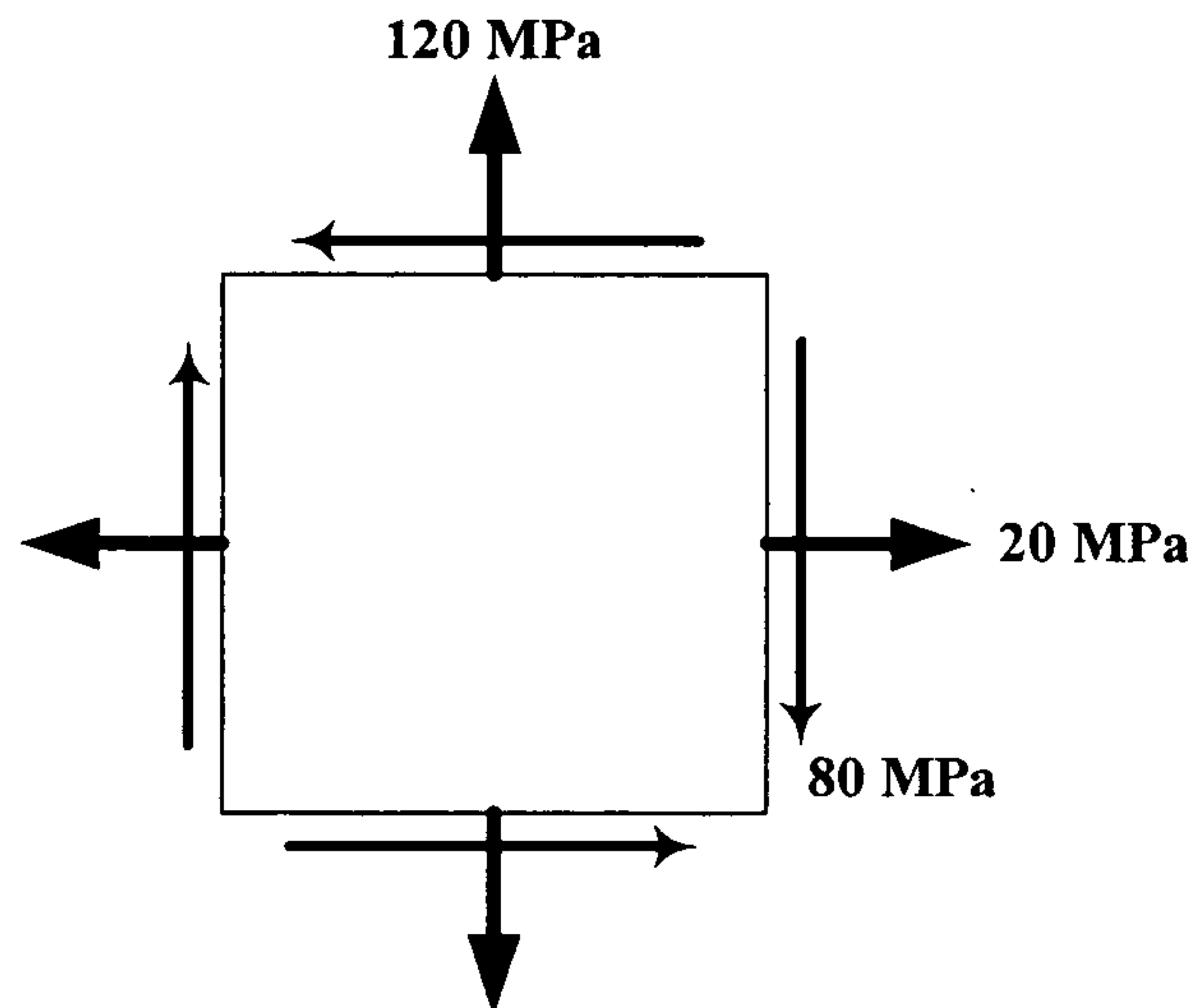
國立清華大學 103 學年度碩士班考試入學試題

系所班組別：工程與系統科學系乙組

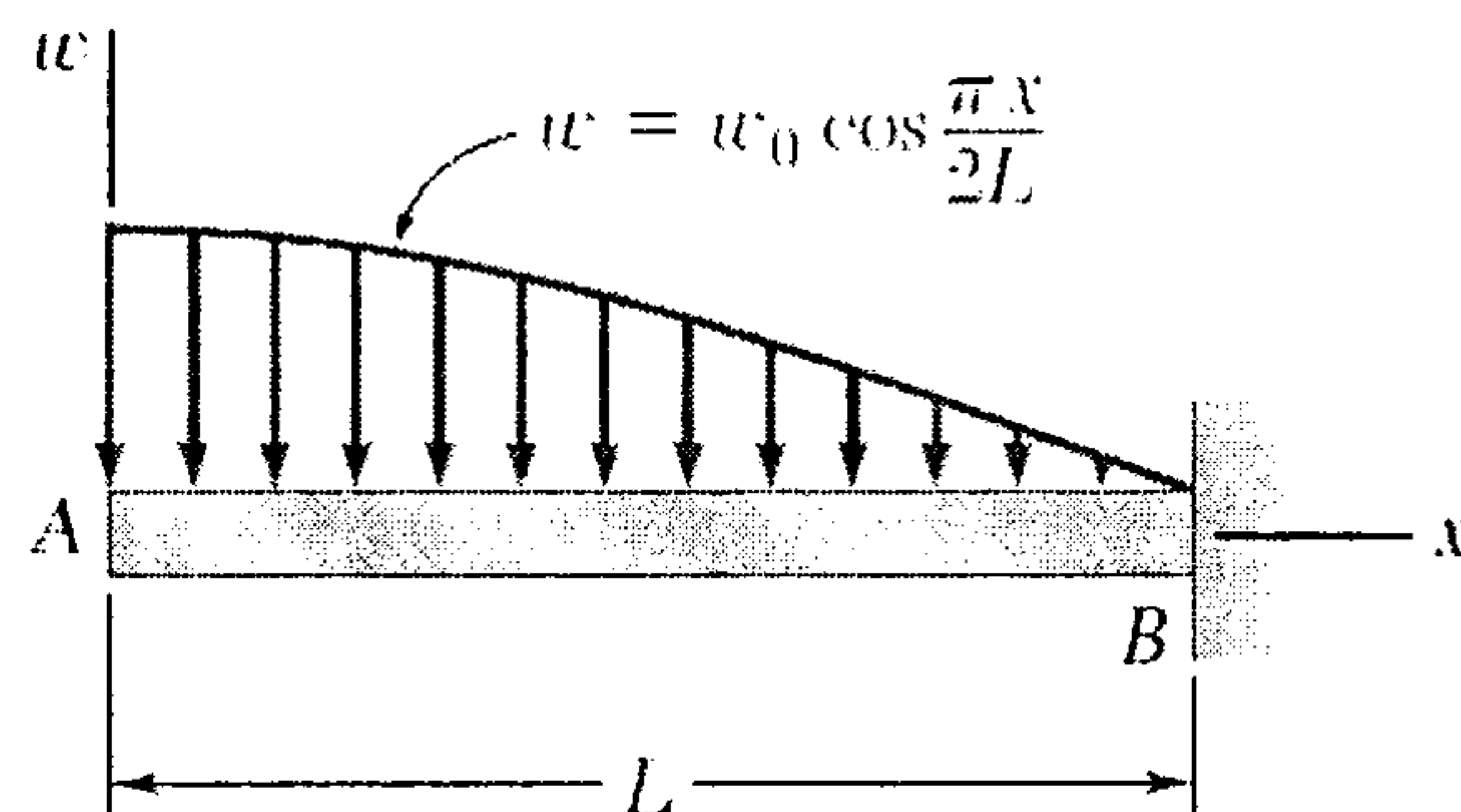
考試科目（代碼）：工程力學（含靜力學、材料力學）（2705）

共 3 頁，第 1 頁 \*請在【答案卷、卡】作答

1. For the state of plane stress shown, use Mohr's circle to determine
  - a. the stress components exerted on the element obtained by rotating the given element counterclockwise through  $25^\circ$  (8%)
  - b. the principle planes and the principle stresses (12%)



2. Determine the equations of the shear and bending-moment curves for the beam and loading shown. (20%)



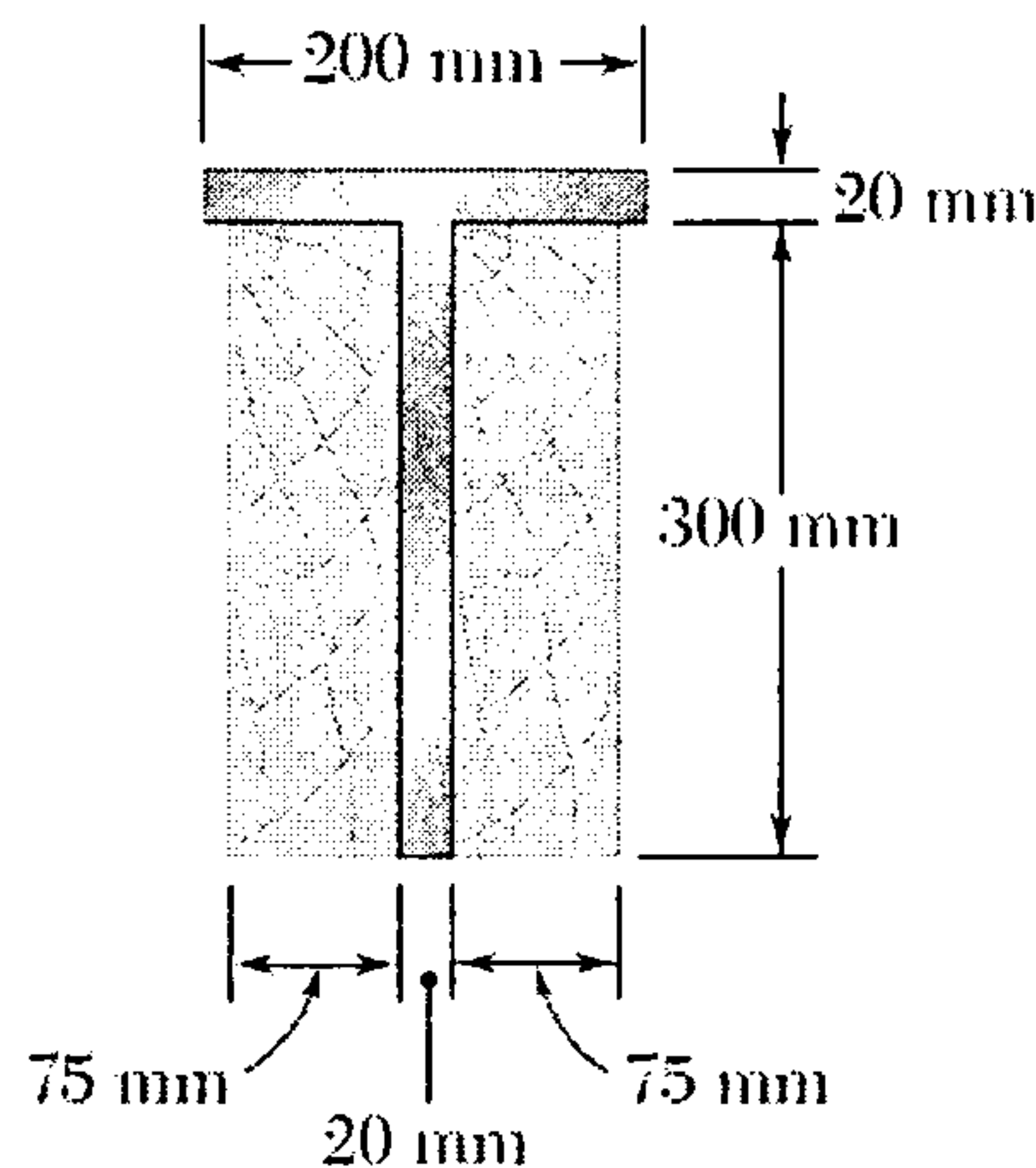
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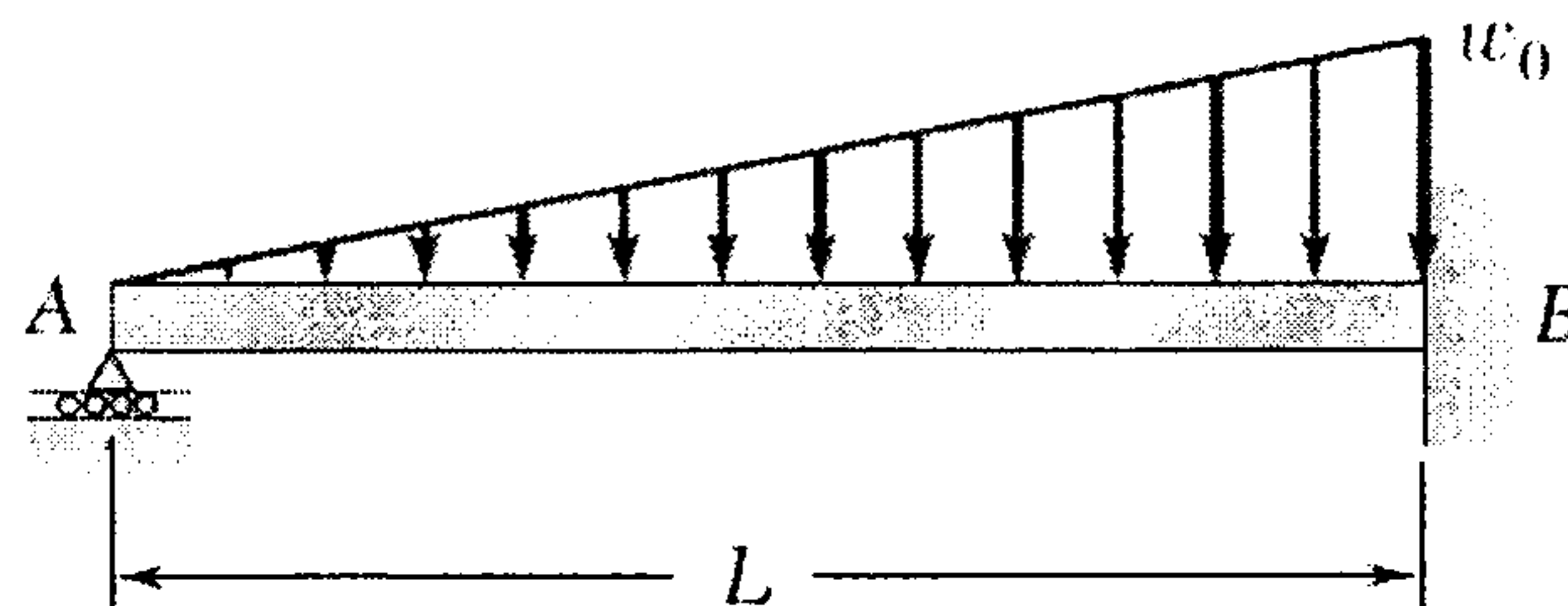
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3. Two steel plates have been welded together to form a beam in the shape of a T that has been strengthened by securely bolting to it the two oak timbers shown. The modulus of elasticity is 12.5 GPa for the wood and 200 GPa for the steel. Knowing that a bending moment  $M = 50 \text{ kN}\cdot\text{m}$  is applied to the composite beam, determine
- the maximum stress in the wood (10%)
  - the stress in the steel along the top edge (10%)



4. For the beam and loading shown, determine
- the equation of the elastic curve (10%)
  - the reaction at A (5%)
  - the slope at A (5%)



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5. The compound arrangement of the pan scale is shown. If the mass on the pan is 4 kg, determine the horizontal and vertical components at pins A, B, and C (15%) and the distance  $x$  of the 25-g mass to keep the scale in balance (5%).

