

系所組別： 工程科學系丙、己組

考試科目： 材料力學

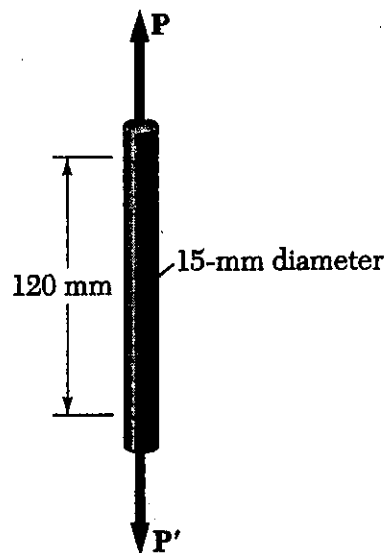
考試日期： 0307，節次： 2

※ 考生請注意：本試題 可 不可 使用計算機

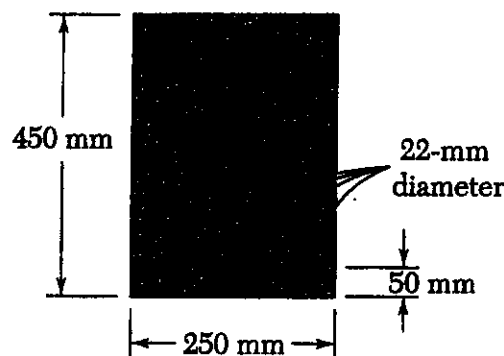
1. (10pts) Please define the following terms:

(a) dilatation, (b) shear strain, (c) four-point bending, (d) elastic section modulus, (e) von Mises yield criterion.

2. (10pts) A standard tension test is used to determine the properties of an experimental plastic. The test specimen is a 15-mm-diameter rod and it is subjected to a 3.5-kN tensile force. Knowing that an elongation of 11 mm and a decrease in diameter of 0.62 mm are observed in a 120-mm gage length, determine Young's modulus, shear modulus and Poisson's ratio of the material.



3. (20pts) The reinforced concrete beam shown is subjected to a positive bending moment of 175 kN·m. Knowing that the modulus of elasticity is 25 GPa for the concrete and 200 GPa for the steel, determine (a) the stress in the steel, (b) the maximum stress in the concrete.



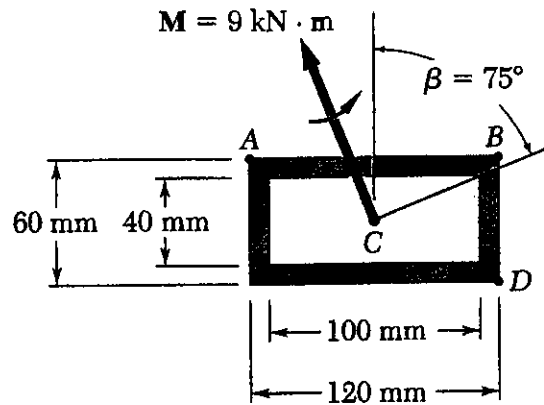
(背面仍有題目,請繼續作答)

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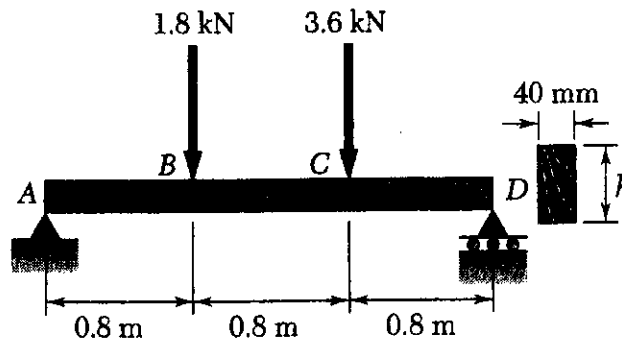
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4. (20pts) The couple M is applied to a beam of the cross section shown in a plane forming an angle β with the vertical. Determine the stress at (a) point A, (b) point B, (c) point D.



5. (20pts) For the beam and loading shown, design the cross section of the beam, knowing that the grade of the timber used has an allowable normal stress of 12 MPa.



6. (20pts) For the beam and loading shown, determine the deflection at the midpoint D. Use $E = 200 \text{ GPa}$ and $I = 6.87 \times 10^{-6} \text{ m}^4$.

