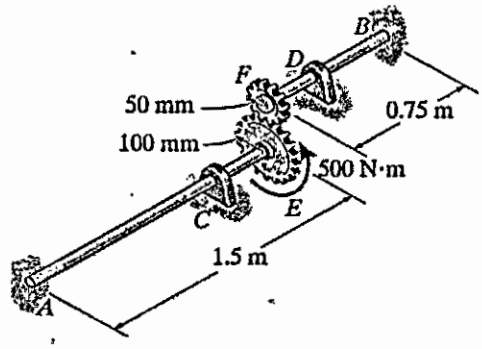
國立雲林科技大學 104 學年度 碩士班招生考試試題

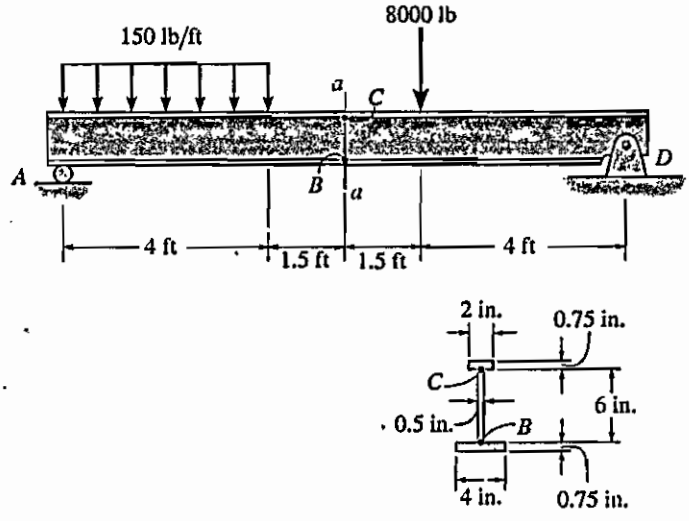
系所：機械系

科目：材料力學

1. The two shafts are made of A-36 steel. Each has a diameter of 25 mm and they are connected using the gears fixed to their ends. Their other ends are attached to fixed supports at *A* and *B*. They are also supported by journal bearings at *C* and *D*, which allow free rotation of the shafts along their axes. If a torque of 500 N·m is applied to the gear at *E* as shown, determine the reactions at *A* and *B*. Determine the rotation of the gear at *E*. The shear modulus of A-36 steel is *G*=75 GPa. [25%]



2. Determine the shear stress at points *B* and *C* on the web of the beam located at section *a*-*a*. [25%]



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3. The member shown in Fig. 3 has a rectangular cross section.

(a) Determine the reaction at point A. (5%)

(b) Determine the reaction at point B. (5%)

(c) Determine the state of stress that the loading produces at point C. (15%)

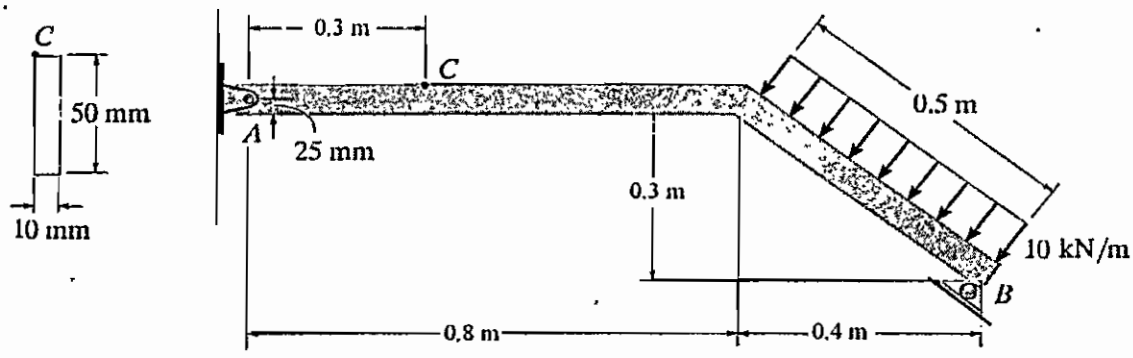

Fig. 3

4. The simply supported box beam shown in Fig. 4 supports the triangular distributed loading. If the material of the beam is linearly elastic and follows Hooke's law. The material's modulus of elasticity is 200 GPa.

(a) Determine the moment in the beam as a function of x for $0<x\leq 5$. (10%)

(b) Determine its maximum deflection. (15%)

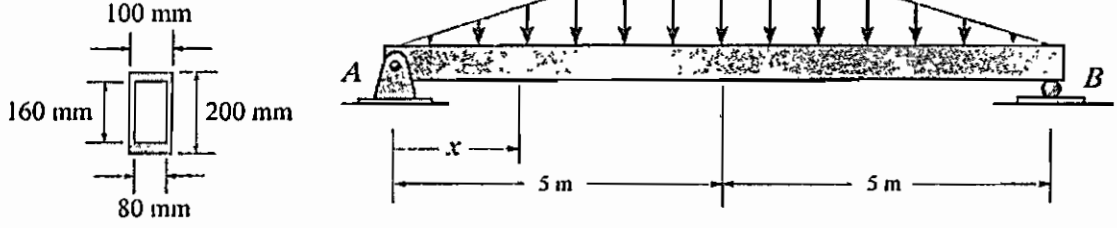

Fig. 4