

國立清華大學 107 學年度碩士班考試入學試題

系所班組別：動機系 丙組

考試科目（代碼）：工程力學 (1301)

共 3 頁，第 1 頁 *請在【答案卷、卡】作答

1. A stack of four identical bricks of length a is piled so that each has the maximum possible overhang without toppling. What is the value of b in terms of a ? (25%)

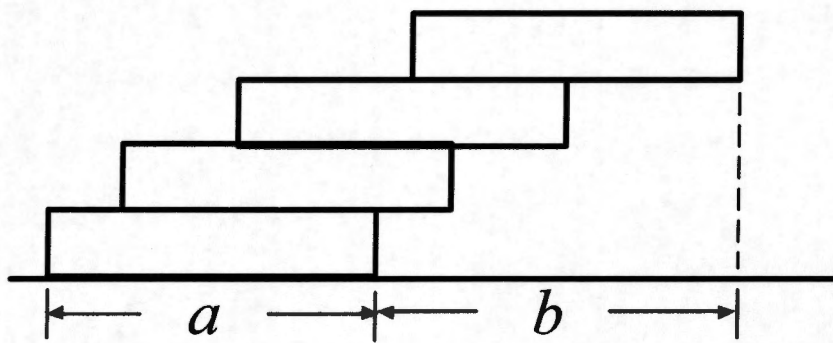


Fig. 1

2. A friction lock has a uniform slender bar of length L and weight W hinged at A as shown below. What coefficient of friction is necessary, assuming it to be the same at both contact surfaces, so that a slab of negligible weight will not slip under force P of any magnitude? (25%)

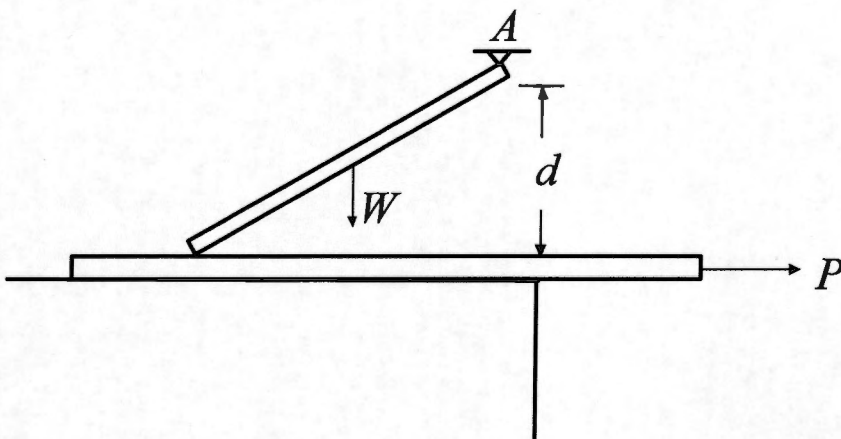


Fig. 2

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3. Four inelastic cables C are attached to a plate P and hold the 0.6m long spring 0.1m in compression when *no weight* is on the plate. There is also an undeformed spring nested within this compressed spring. If the block, having a weight of 60 N (=6kg) is moving downward at $v = 2\text{m/s}$, when it is 1.3m above the plate, determine the maximum compression in each spring after it strikes the plate. Neglect the mass of the plate and spring and any energy lost in the collision. (25%)

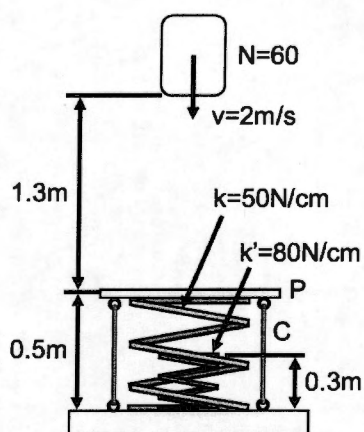


Fig. 3

4. At a given instant the wheel is rotating with the angular motions shown (Fig. 4). Determine the acceleration of the collar at A at this instant. (25%)

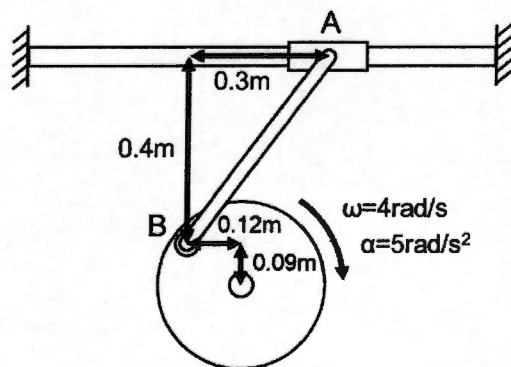


Fig. 4

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5. A 50-mm-diameter steel (Young's modulus = 200 GPa and Poisson's ratio = 0.30) bar is subjected to a tensile load P and a torque T as shown in Fig. 5. Determine the axial load P and the torque T if the strains indicated by gages a and b on the bar are 1414μ and -212μ . (25%)

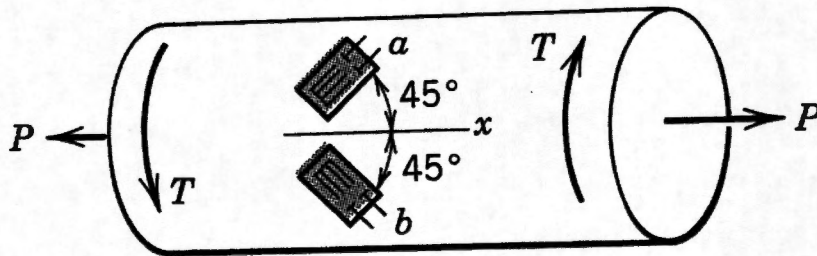


Fig. 5

6. Determine the moment reactions at the supports A and B , then draw the shear and moment diagrams. EI is constant. THE MOMENT-AREA THEOREMS MUST BE USED. (25%)

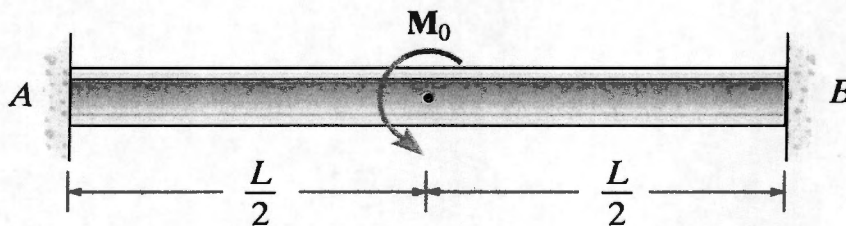


Fig. 6