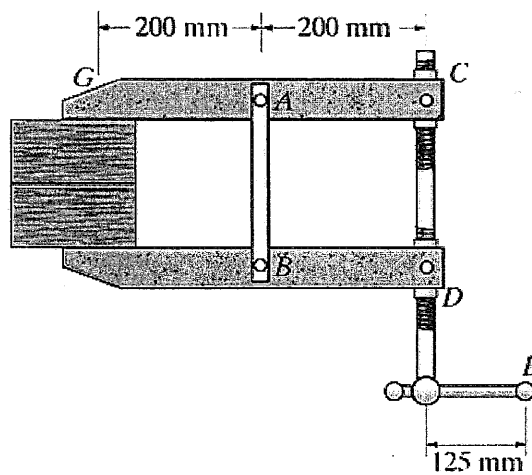


※ 考生請注意：本試題可使用計算機。請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

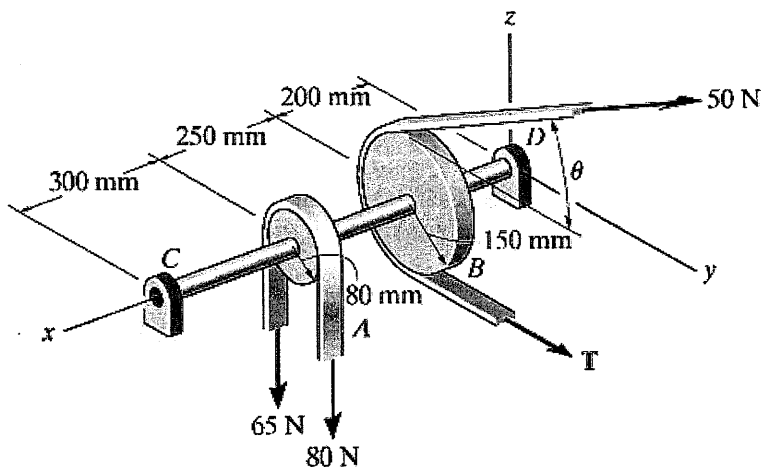
一、As shown in figure, the mean diameter and lead of the single square-threaded screw at C and D are 25 mm and 5 mm, respectively. The coefficient of static friction is $\mu_s = 0.3$.

- (a) Determine the lead angle of the screw. (5%) (b) If a horizontal force of $F = 50$ N is applied perpendicular to the handle of the lever at E , determine the clamping force developed at G . The solution must include free-body diagram. (15%) (c) If the force F is removed from the handle of the lever at E in (b), determine if the screw is self-locking. (5%)

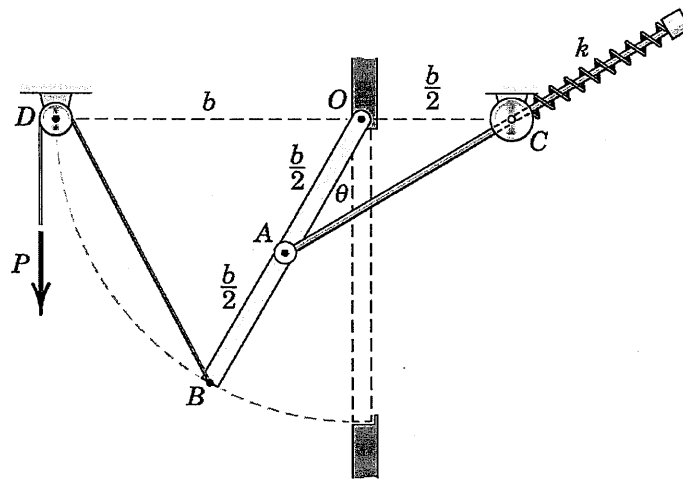


二、As shown in figure, both pulleys are fixed to the shaft and as the shaft turns with constant angular velocity, the power of pulley A is transmitted to pulley B . The solutions must include free-body diagrams.

- (a) Explain the functions of the journal bearing C and thrust bearing D , respectively, and draw their reactions, respectively. (9%) (b) Determine the horizontal tension T in the belt on pulley B and the reactions at the journal bearing C and thrust bearing D if $\theta = 0^\circ$. The bearings are in proper alignment and exert only force reactions on the shaft. (8%) (c) Determine the horizontal tension T in the belt on pulley B and the reactions at the journal bearing C and thrust bearing D if $\theta = 30^\circ$. The bearings are in proper alignment and exert only force reactions on the shaft. (8%)



- 三、 The figure shows the side view of a door to a storage compartment. As the door is opened, the light rod, which is connected at A , slides through the collar at C and compresses the spring of stiffness k . Determine the force P required to hold the door in an arbitrary position θ . The uniform door has mass m , and the spring is undeformed when the door is vertical. (25%)



四、專業英文：

1. 英翻中：

- (a) Friction is a force that resists the movement of two contacting surfaces that slide relative to one another. This force always acts tangent to the surface at the points of contact and is directed so as to oppose the possible or existing motion between the surfaces. (7%)
- (b) If a plane truss has more external supports than are necessary to ensure a stable equilibrium configuration, the truss as a whole is statically indeterminate, and the extra supports constitute external redundancy. (7%)

2. 請用英文解釋與定義下列名詞：

- (a) The method of joints (5%)
- (b) Concurrent forces (3%)
- (c) Coplanar forces (3%)