

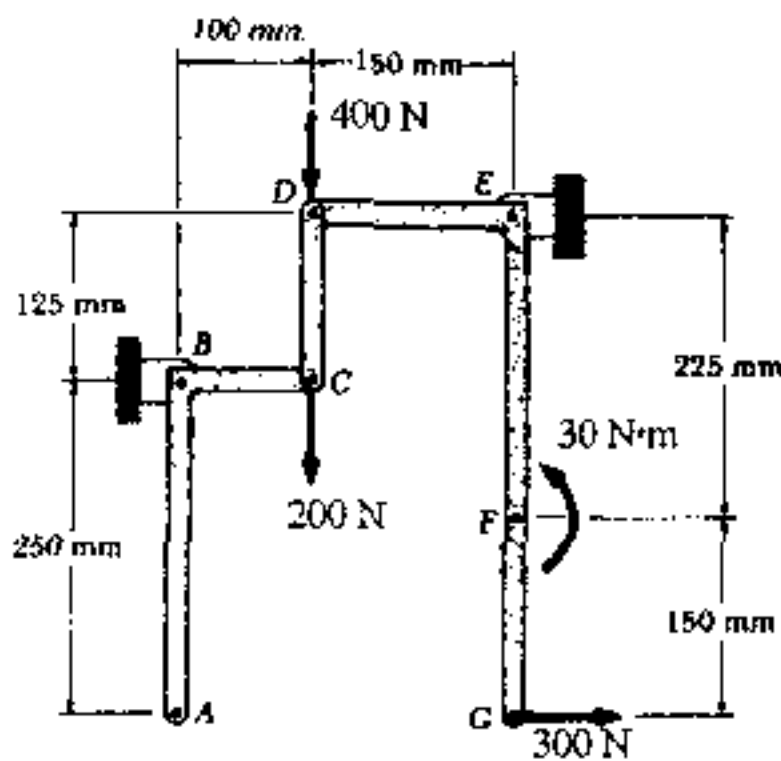
八十七學年度 動力機械工程系 (所) 丙、丁 組碩士班研究生入學考試

科目 應用力學 科號 2702 共 3 頁第 1 頁 \*請在試卷【答案卷】內作答

1. Explain the following items briefly (20%, 4% each)
  - (a) parallel-axis theorem for moment of inertia of masses
  - (b) statically indeterminate structures
  - (c) perfectly plastic impact
  - (d) self-locking screws
  - (e) resonance

2. Use the principle of virtual work to
  - (a) determine the horizontal force  $P$  which must be applied at  $A$  to maintain the equilibrium of the linkage.
  - (b) determine the couple  $M$  which must be applied to member  $ABC$  to maintain the equilibrium of the linkage.

(15%)

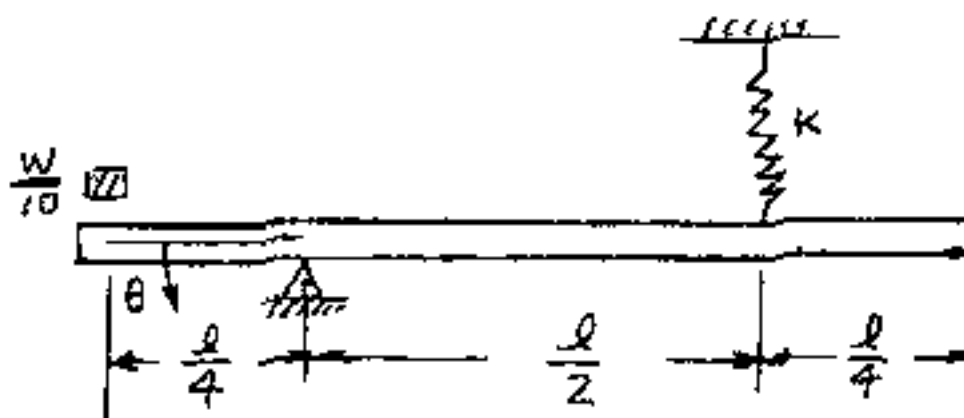


八十七學年度動力機械工程學系(所) 丙、丁 組碩士班研究生入學考試

科目 應用力學 科號 <sup>2702</sup> 2802 共 3 頁第 2 頁 \*請在試卷【答案卷】內作答

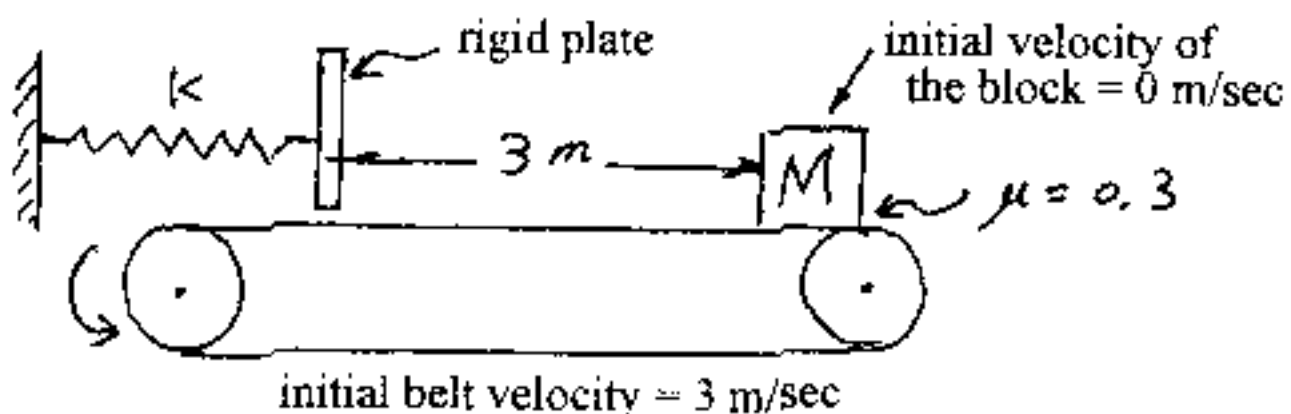
3. A uniform bar of weight  $W$  is in static equilibrium horizontally as shown. Small oscillations occur when a mass of weight  $W/10$  is gently placed on the left end of the bar and released. Find the relationship between  $\theta$  and time.

(15%)



4. A block of mass  $M$  is placed on the belt 3 m from the rigid plate of mass 10 kg. The belt velocity is 3 m/sec and the coefficient of kinetic friction between the block and belt is 0.3.
- (a) How long will it take for the block to reach the plate?
- (b) If the block is attached to the rigid plate after contact, the spring constant  $k = 130 \text{ N/m}$  and  $M = 14 \text{ kg}$ , find the maximum deflection of the spring.

(20%)

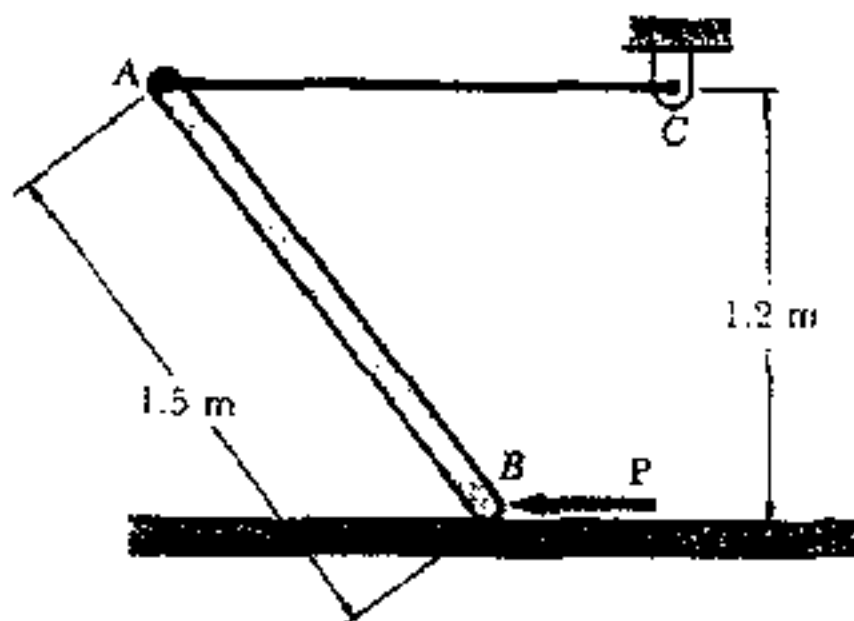


八十七學年度動力機械工程學系(所)丙、丁組碩士班研究生入學考試

科目 應用力學

科號 2702 共 3 頁第 3 頁 \*請在試卷【答案卷】內作答

5. End B of the 10-kg uniform rod AB rests on a frictionless floor, while end A is attached to a horizontal cable AC. Knowing that at the instant shown the force P causes end B of the rod to start from rest with an acceleration of  $3 \text{ m/s}^2$  to the left, determine
- the force P,
  - the corresponding tension in cable AC.
- (15%)



6. The ends of a chain lie in piles at A and C. The mass per unit length and the acceleration of gravity are denoted by  $m$  and  $g$ , respectively. When released from rest at time  $t = 0$ , the chain moves over the pulley at B, which has a negligible mass. Denoting by  $L$  the length of chain connecting the two piles and neglecting friction, determine the speed  $v$  of the chain at time  $t$ .
- (15%)

