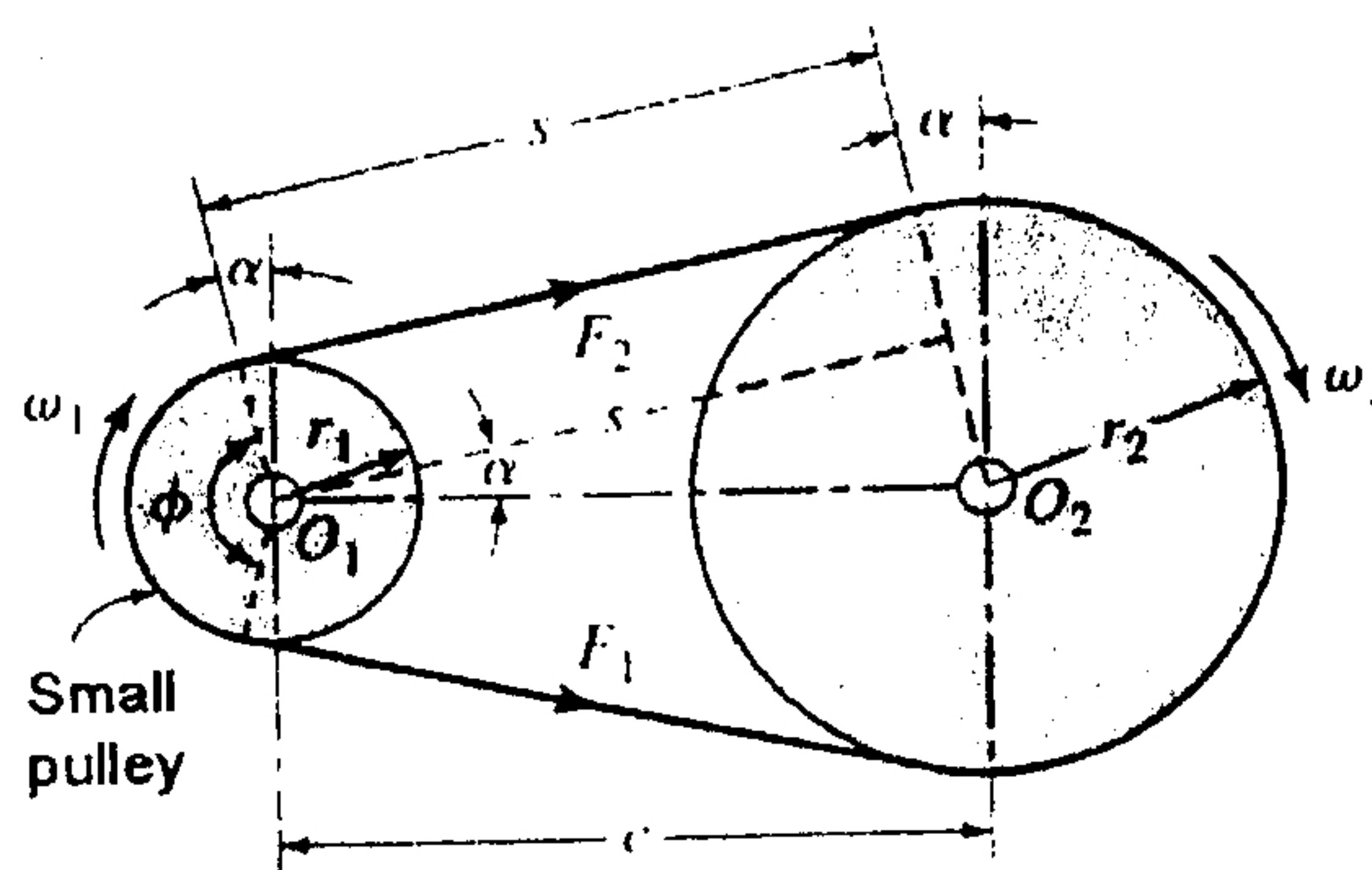


1. 請將下列小題，中文翻譯成英文、英文翻譯成中文：

- (a) 機械工程系有許多基礎課目，應用力學、材料力學、熱力學、流體力學、機械製造與材料、自動控制、機動學、機械設計等都在其中。(8%)
- (b) Brakes and clutches are essentially the same devices. The brake absorbs the kinetic energy of moving bodies and thus controls the speed. The clutch transmits power between two shafts or elements which must be often connected and disconnected. (9%)
- (c) The master entrance exam is not "tricky" and problems are generally practical, dealing with common and plausible situations that you might utilize in your future study. Examinees manage to fail on a regular basis with perfectly straight-forward problems. The exam problems are difficult on their own right. (8%)

2. In a typical flat belt drive as shown,  $F_1$  and  $F_2$  are tension on the tight and slack sides. Neglect the centrifugal force in this case. The contact angle on the small pulley is  $\phi$  and  $f$  represents the coefficient of friction.

- (a) Draw the free body diagram of the belt element and prove  $F_1 = F_2 e^{f\phi}$  (10%)
- (b) The maximum allowable tension in the belts is 2400 N. Please compute the largest torque which can be exerted by the belt on the small pulley. ( $r_1=40\text{mm}$ ,  $r_2=200\text{mm}$ ,  $f=0.3$ ,  $\phi=120^\circ$ ) (7%)
- (c) Please determine how to increase the 15% capacity of the torque in (b) by adjusting the center distance between two pulleys. (8%)



Problem 2

(背面仍有題目,請繼續作答)

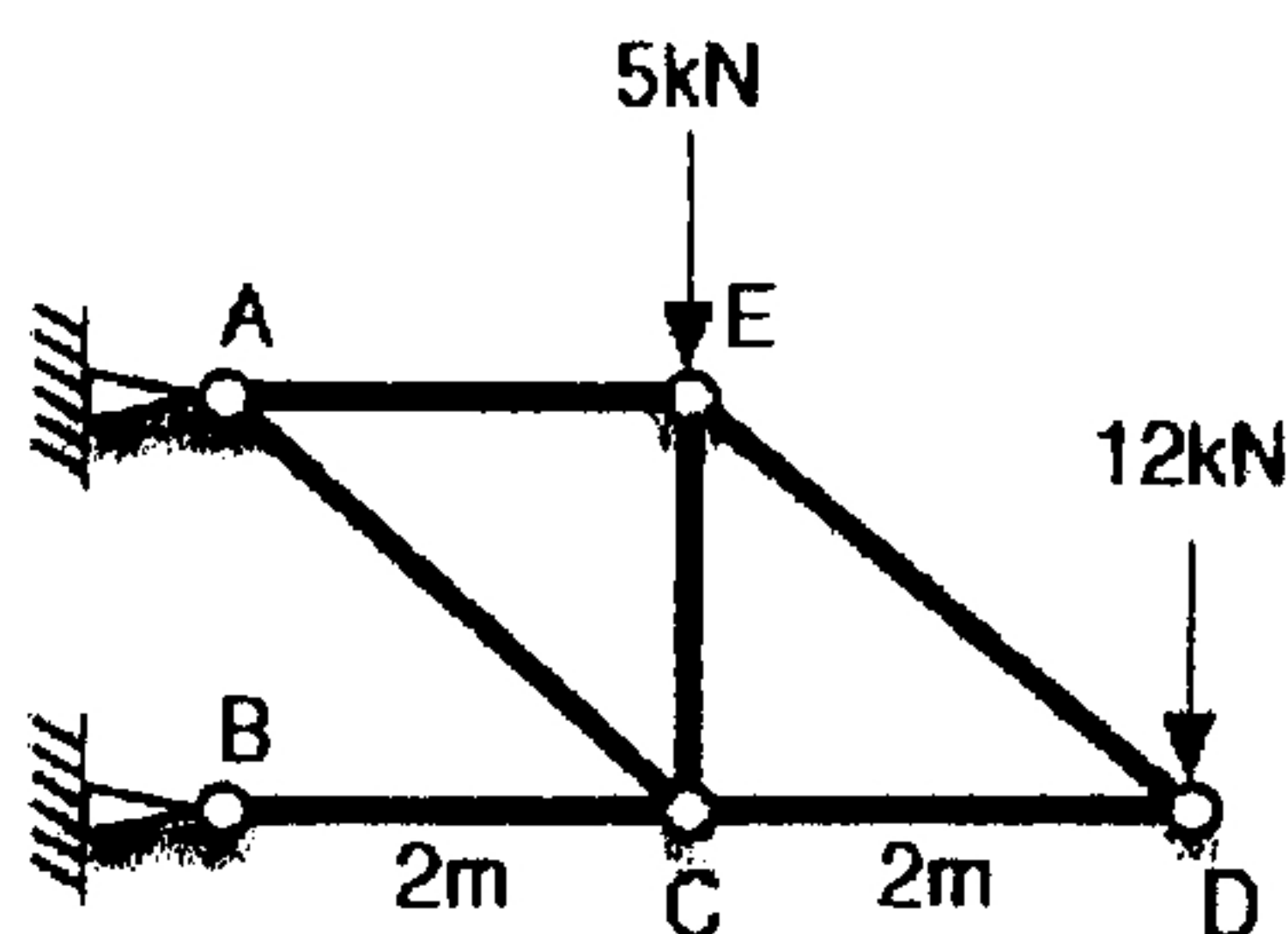
本試題是否可以使用計算機：☒可使用，☐不可使用（請命題老師勾選）

考試日期：0301，節次：1

3. Answer the following questions of the truss structure as shown. Assuming all members are identical and the weight of the structure is negligible.

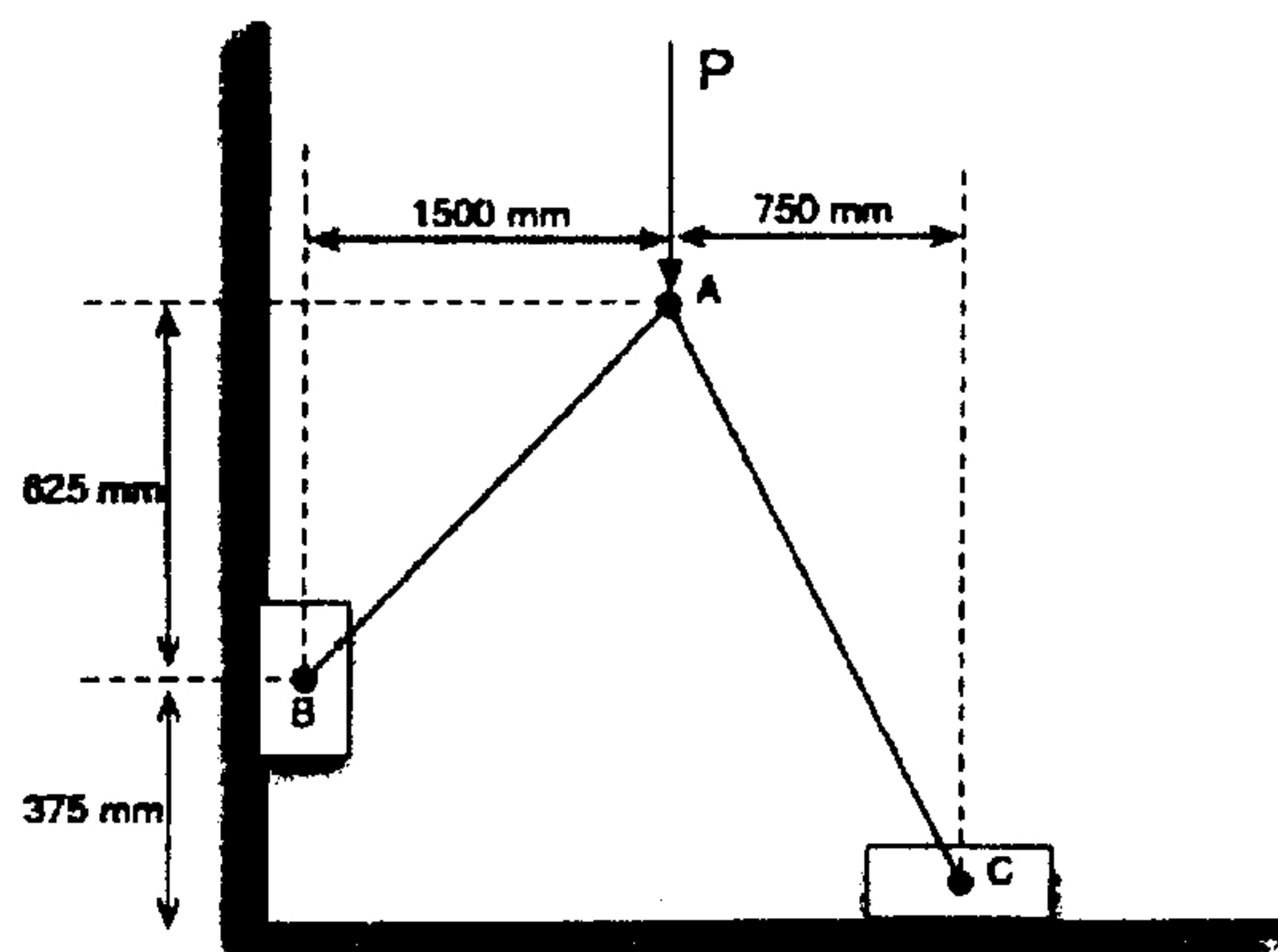
(a) Find the reaction forces at A and B (15%)

(b) Determine the tension (compression) force of the member CD (10%)



Problem 3

4. Two slender rods of negligible weight are pin-connected at A and attached to the 8-kg block B and the 36-kg block C as shown. The coefficient of static friction is 0.55 between all surface of contact. Determine the range of values of  $P$  for which equilibrium is maintained. (25%)



Problem 4