

系所組別： 工程科學系丙、戊、己組

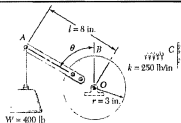
考試科目： 工程力學

考試日期： 0307，節次： 1

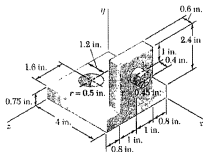
※ 考生請注意：本試題  可  不可 使用計算機

注意：本試卷共八題，每題只有一個答案。批改人員將只看每題的最後答案（含單位）。計算過程只作為確認答案來源（以防作弊）而不予記分。請考生將每題的最後答案（含單位）以方形框框標註出來，以利批改作業，減少人為錯誤。數值答案若偏離標準答案，將依偏離程度酌情評分。

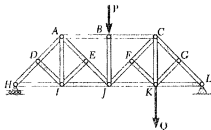
1. (10%) A 400-lb weight is attached at  $A$  to the lever shown. The constant of the spring  $BC$  is  $k = 250 \text{ lb/in.}$ , and the spring is unstretched when  $\theta = 0$ . Determine the position (the angle  $\theta$ ) of equilibrium.



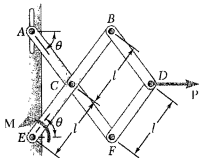
2. (10%) For the machine element shown, determine the  $x$  coordinate of the center of gravity.



3. (10%) For the non-zero forces  $P$  and  $Q$ , point out the zero-force members in the truss shown.



4. (15%) Determine the magnitude of the moment  $M$  required to maintain the equilibrium of the mechanism shown.



(背面仍有題目,請繼續作答)

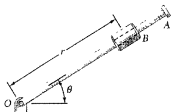
系所組別： 工程科學系丙、戊、己組

考試科目： 工程力學

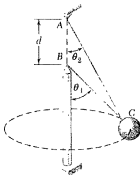
考試日期： 0307，節次： 1

※ 考生請注意：本試題 可 不可 使用計算機

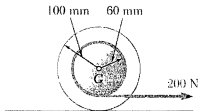
5. (10%) The rotation of the 0.9-m arm  $OA$  about  $O$  is defined by the relation  $\theta = 0.15t^2$  where  $\theta$  is expressed in radians and  $t$  in seconds. Collar  $B$  slides along the arm in such a way that its distance from  $O$  is  $r = 0.9 - 0.12t^2$ , where  $r$  is expressed in meters and  $t$  in seconds. After the arm  $OA$  has rotated through  $30^\circ$ , determine the magnitude of the velocity of the collar  $v_B$ .



6. (15%) A single wire  $ACB$  of length 2 m passes through a ring at  $C$  that is attached to a sphere which revolves at a constant speed  $v$  in the horizontal circle shown. Knowing that  $\theta_1 = 60^\circ$  and  $\theta_2 = 30^\circ$ , and that the tension is the same in both portion of the wire, determine the speed  $v$ .



7. (15%) A cord is wrapped around the inner drum of a wheel and pulled horizontally with a force of 200 N. The wheel has a mass of 50 kg and a radius of gyration of 70 mm. Knowing  $\mu_s = 0.20$  and  $\mu_k = 0.15$ , determine the magnitude of the angular acceleration  $\alpha$  of the wheel.



8. (15%) Determine the period  $T$  of small oscillations of a cylinder of radius  $r$  which rolls without slipping inside a curved surface of radius  $R$ . Express your answer in terms of  $R$ ,  $r$ , and  $g$ , where  $g$  is the gravitational acceleration.

