

國立交通大學 97 學年度碩士班考試入學試題

目：應用力學(3042)

一般(在職)

考試日期：97 年 3 月 8 日 第 2 節

所班別：機械工程學系

組別：機械系丁組

第 1 頁, 共 2 頁

可使用計算機】\*作答前請先核對試題、答案卷(試卷)與准考證之所組別與考科是否相符!!

1. The uniform plate shown in Fig. (1) rotates in the vertical plane about a pin at point  $A$ . The mass of the plate is  $m$ . The plate is released from rest at  $\theta = 0$ . (a) Show the angular velocity of the plate as a function of  $\theta$ . (b)

Show the force  $(f_x, f_y)$  from the pin as functions of  $\theta$ . (20%)

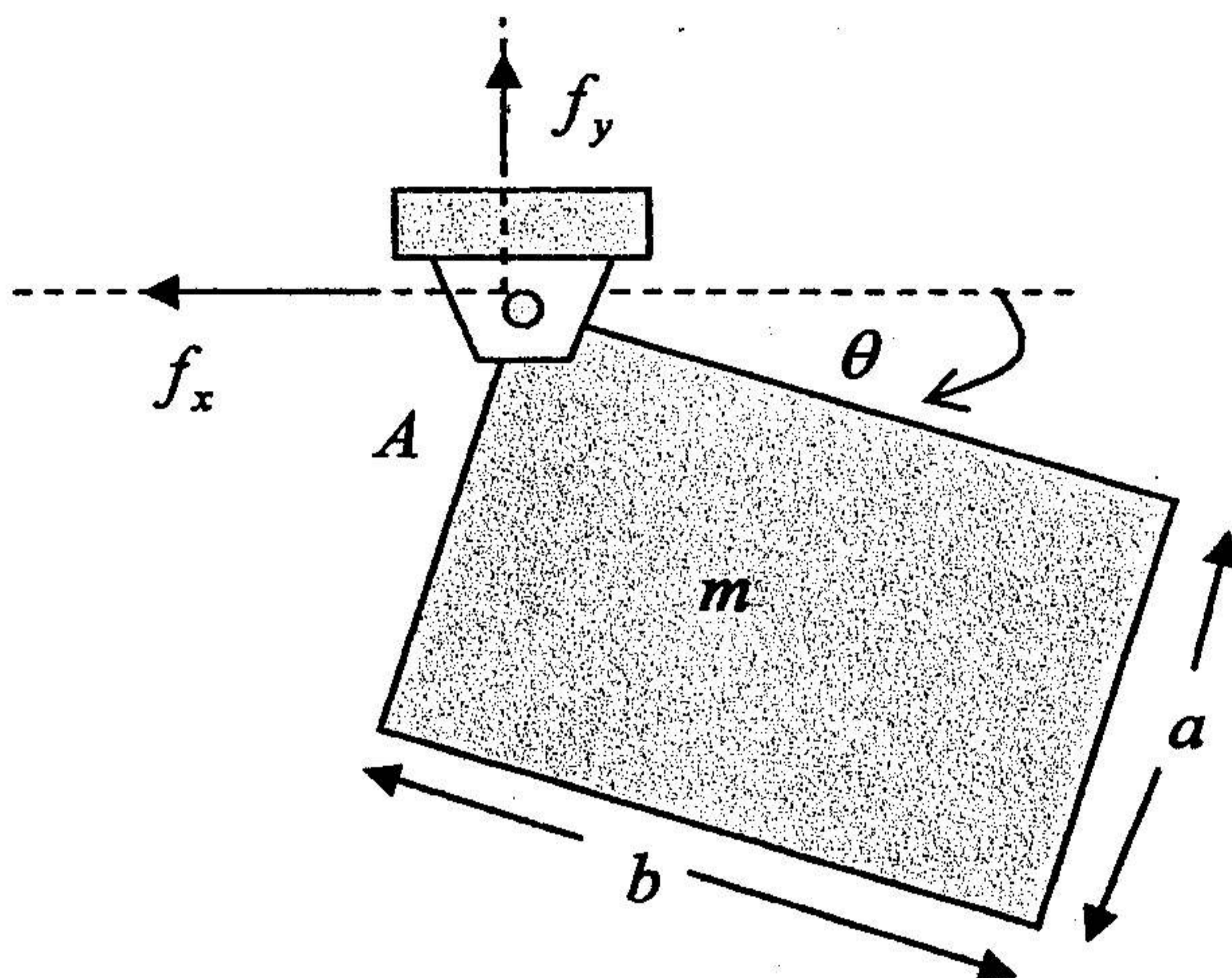


Figure (1)

2. As shown in Fig. (2a), the arm rotates around point  $o$  at the angular velocity  $\omega_{bar}$  and the outer gear  $D$  rotates at the angular velocity of  $\omega_D$ . (a) Show the angular velocities of gear  $A$  and gear  $B$  in terms of  $(\omega_{bar}, \omega_D, r_A, r_B)$  (b) Assuming the goal of this design is the angular velocity of gear  $B$  and  $(\omega_{bar}, \omega_D)$  are inputs to this gear system, please discuss that, under what situations/considerations, the design of Fig.(2a) is preferred as compared to the gear system shown in Fig. (2b). (15%)

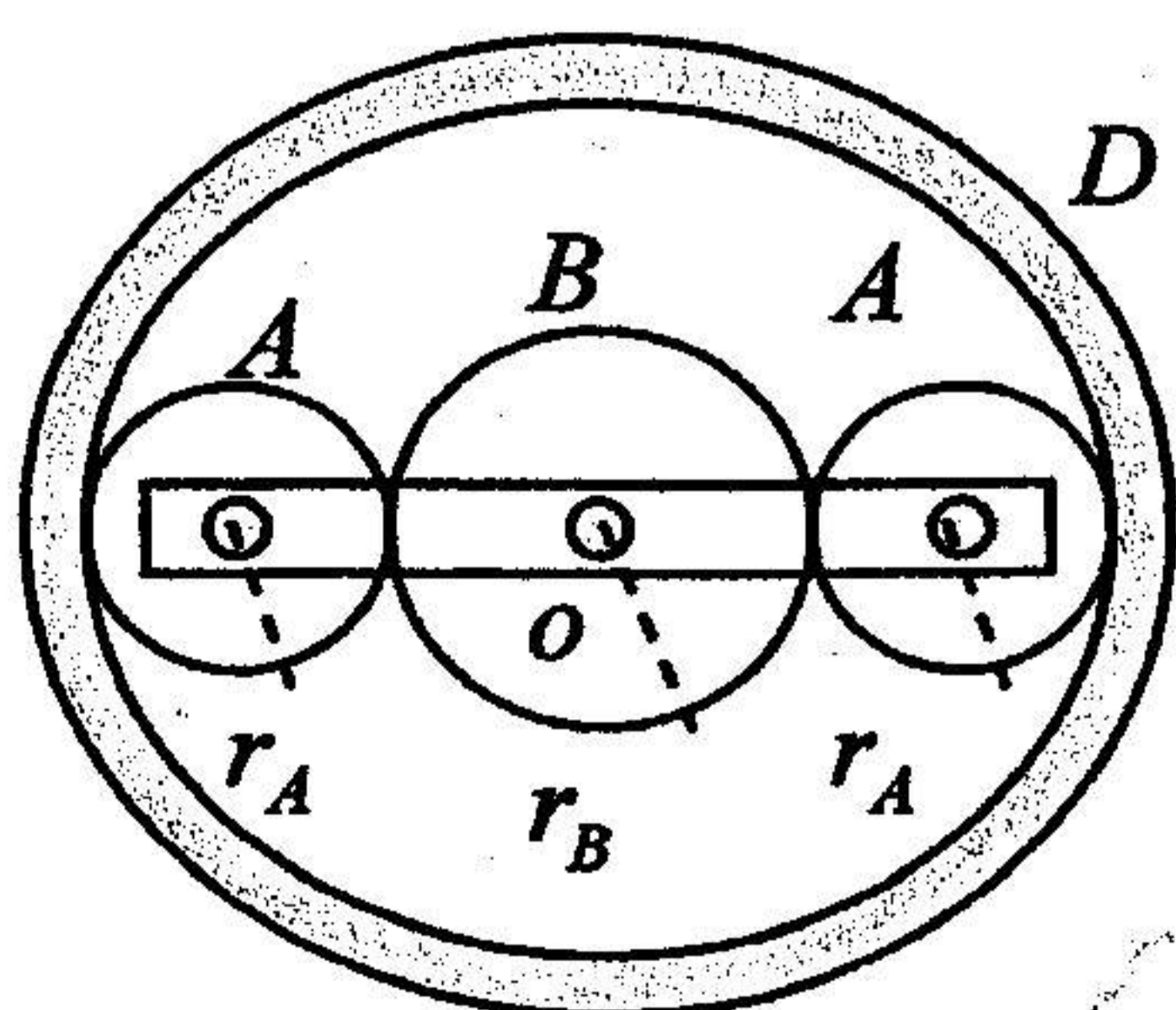


Figure (2a)

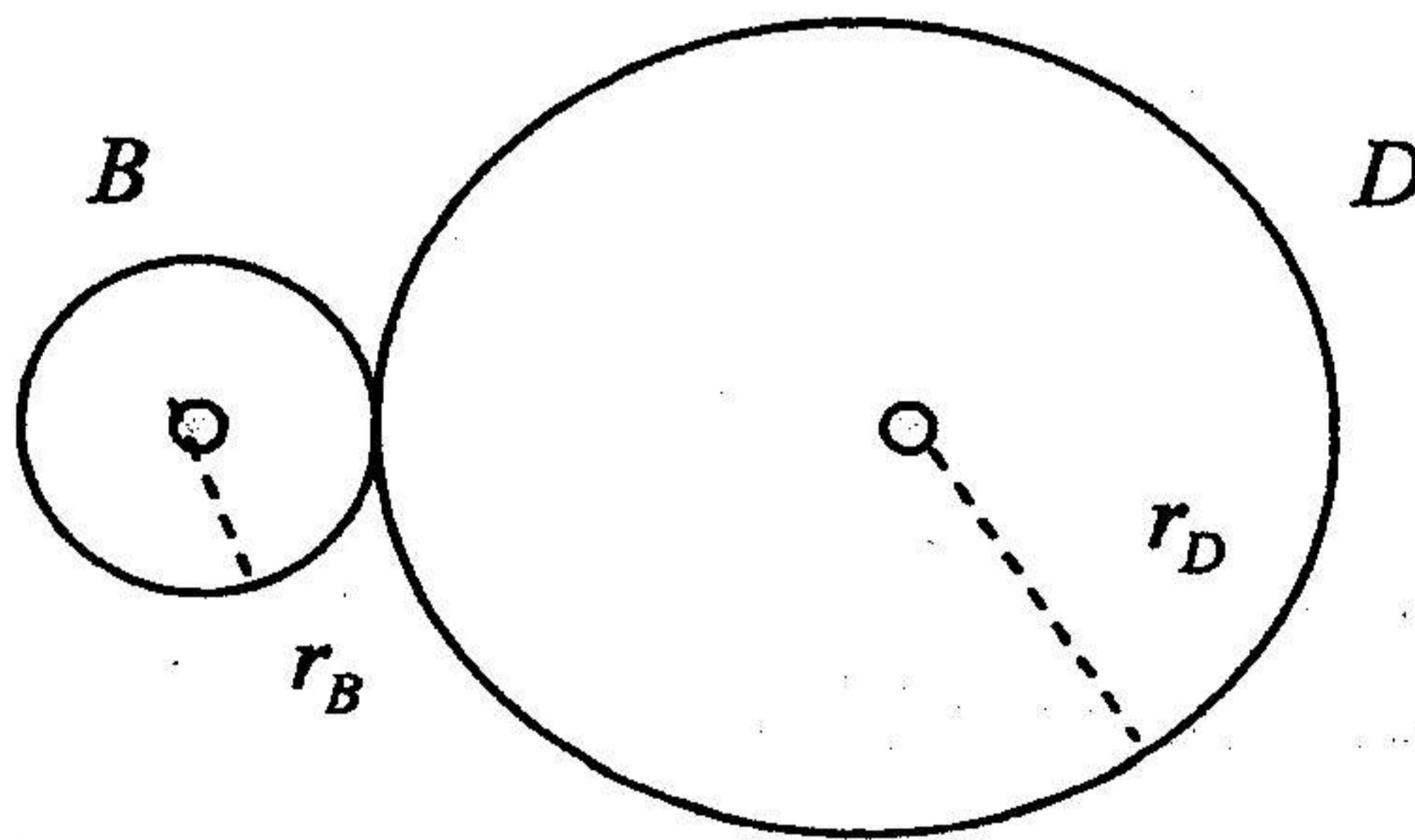


Figure (2b)

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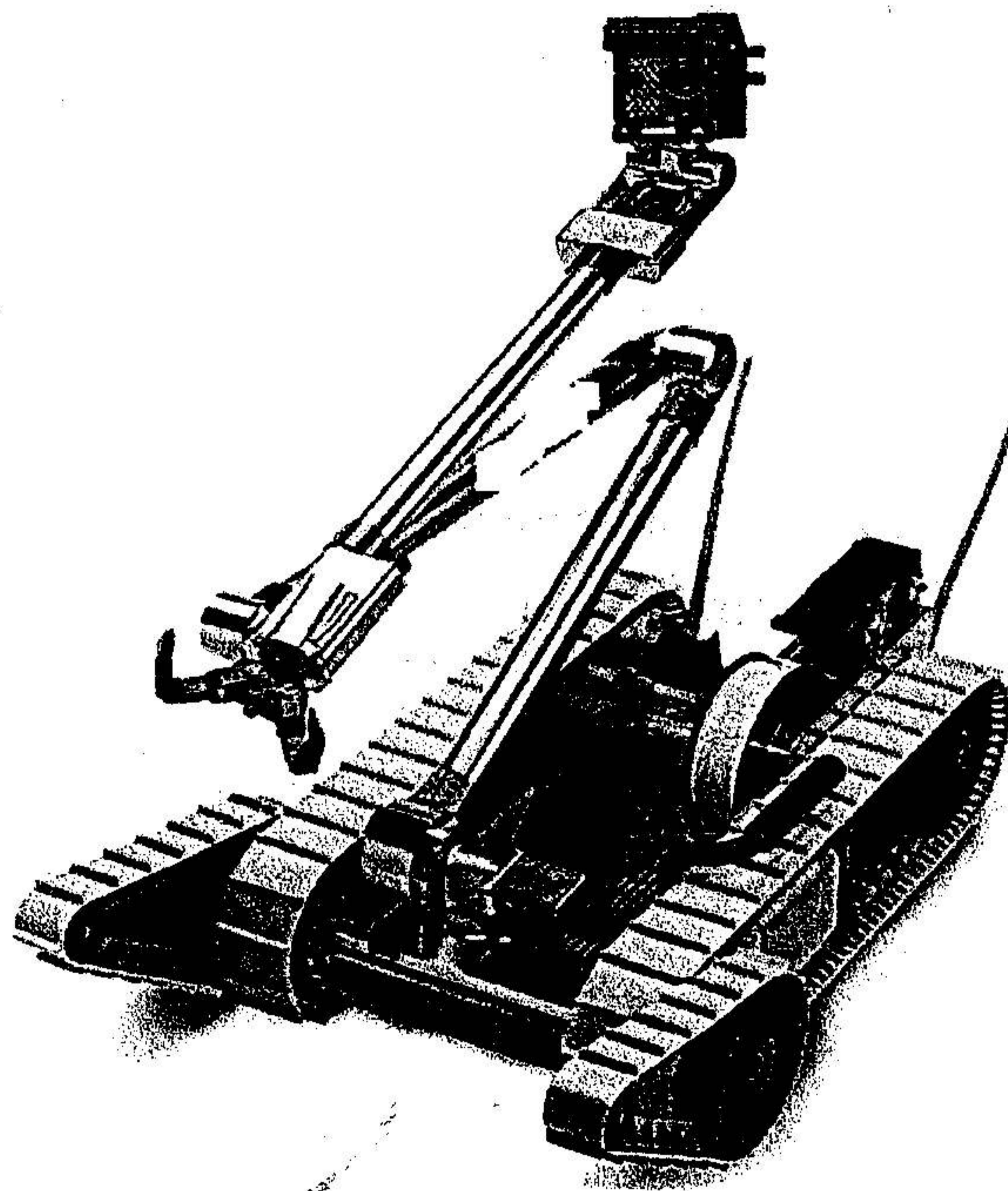
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第 2 頁, 共 2 頁

【可使用計算機】\*作答前請先核對試題、答案卷(試卷)與准考證之所組別與考科是否相符!!

3. Plot a curve to show Coulomb friction versus positive and negative sliding velocities. (10%)

4. (請先將本英文題目翻譯成中文，然後解題) Concerning the device shown in the figure, what tasks do you think it can undertake? Interpret in detail and concretely how it can accomplish these tasks based on your knowledge (20%)



5. (請先將本英文題目翻譯成中文，然後解題) Derive math equations so as to construct the dynamic model of a motorcycle that is making a right turn on level ground. You may neglect the rider body and motorcycle lean (15%)

6. (請先將本英文題目翻譯成中文，然後解題) (a) If a dc source is suddenly applied to a series RL circuit initially at rest, derive its current response and voltage response across the inductor. (b) Plot curves of current versus time and voltage versus time according to (a). (20%)