ME05

國立臺北科技大學 108 學年度碩士班招生考試

系所組別：1120 機械工程系機電整合碩士班乙組

第二節　工程力學　試題

注意事項：

1. 本試題共四題，每題 25 分，共 100 分。
2. 不必抄題，作答時請將試題題號及答案依照順序寫在答案卷上。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

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1. A pipe structure BC is loaded and supported as shown in Fig. 1. The structure has a uniform cross section and a mass of 50 kg. Determine the tension in the cable and the reaction at support C. (25%)
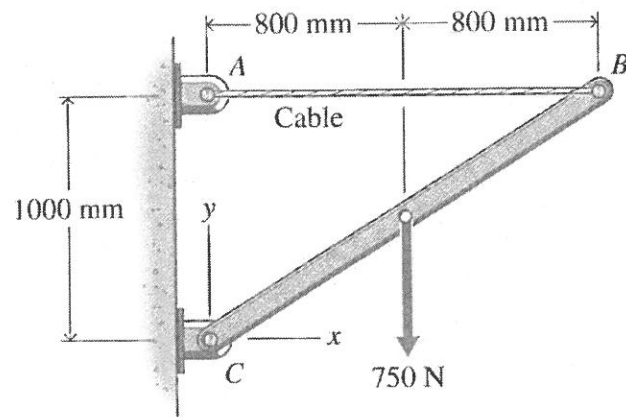

Fig. 1.

2. As shown in Fig. 2, the sliders A and B are connected by a light rigid bar of length $l = 0.5$ m and move with negligible friction in the slots, both of which lie in a horizontal plane. For the position where $x_A = 0.4$ m, the velocity of A is $v_A = 0.9$ m/s to the right. Determine the acceleration of each slider and the force in the bar at this instant. (25%)
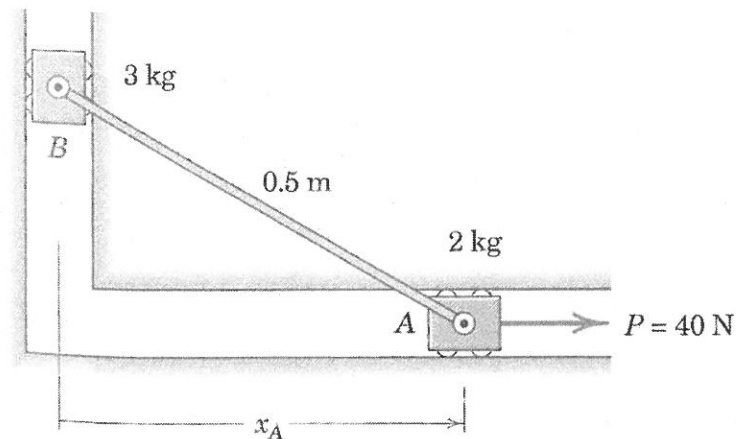

Fig. 2.

3. A metal hoop with a radius $r = 150$ mm is released from rest on the 20° incline as shown in Fig. 3. If the coefficients of static and kinetic fraction are $\mu_s = 0.15$ and $\mu_k = 0.12$, determine the angular acceleration α of the hoop and the time t for the hoop to move a distance of 3 m down the incline. (Hint: $I_G = mr^2$) (25%)
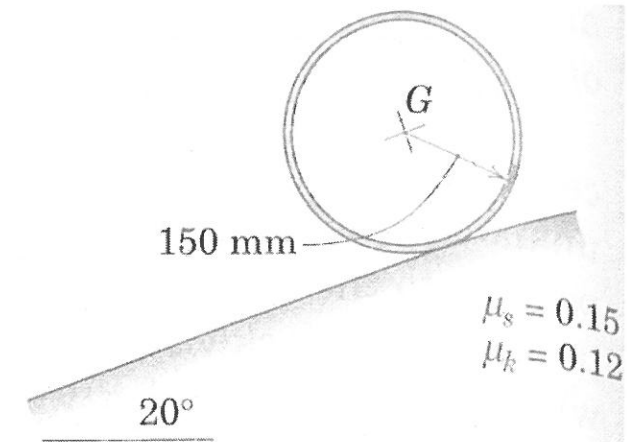

Fig. 3.

4. The uniform rectangular block of dimension shown in Fig. 4 is sliding to the left on the horizontal surface with a velocity v_1 when it strikes the small step at O. Assume negligible rebound at the step and compute the minimum value of v_1 which will permit the block to pivot freely about O and just reach the standing position A with no velocity.
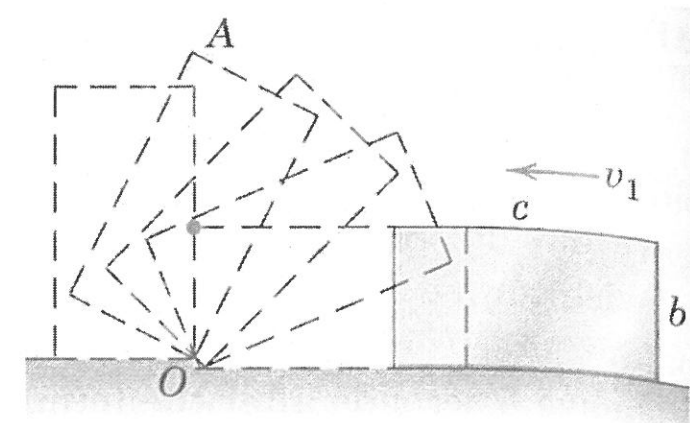
(Hint $I_O = \frac{m}{3}(b^2 + c^2)$.) (25%)

Fig. 4.