

國立台灣科技大學九十五學年度碩士班招生試題

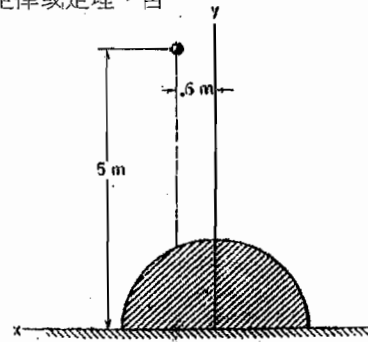
系所組別： 機械工程系碩士班甲組、丁組

科 目： 動力學

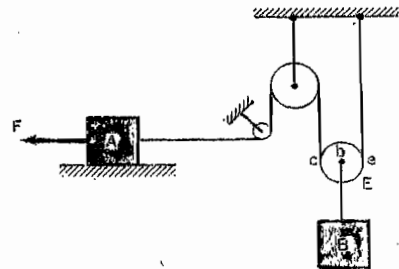
(總分 100 分)

共四題，每題 25 分，可不依序作答。解答時必須註明所依據之定律或定理。自由體圖需簡明繪製於答案卷上。

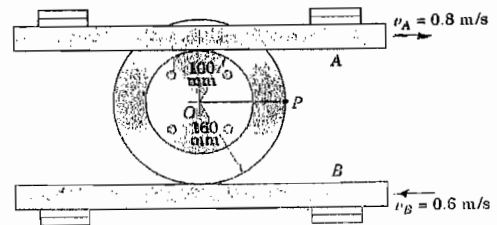
1. A small elastic ball is dropped from a height of 5 m onto a smooth, hard, cylindrical body having a radius of 1.2 m. If the collision is perfectly elastic, at what position on the  $x$  axis does the ball land?



2. Bodies  $A$  and  $B$  are connected to each other through two light pulleys. Body  $A$  has a mass of 500 kg, whereas body  $B$  has a mass of 200 kg. A constant force  $F$  of value 10,000 N is applied to body  $A$  whose surface of contact has a dynamic coefficient of friction equal to 0.4. If the system starts from rest, what distance  $d$  does  $B$  ascend before it has a speed of 2 m/sec?



3. Each of the sliding bars  $A$  and  $B$  engages its respective rim of the two riveted wheels without slipping. If, in addition to the information shown, bar  $A$  has an acceleration of  $2 \text{ m/s}^2$  to the right and there is no acceleration of bar  $B$ , calculate the velocity and acceleration of point  $P$  for the instant depicted.



4. The vertical bar  $AB$  has a mass of 150 kg with center of mass  $G$  midway between the ends (that is,  $AG = 1.2 \text{ m}$ ). The bar is elevated from rest at  $\theta = 0$  by means of the parallel links of negligible mass, with a constant couple applied to the lower link at  $C$ . If the couple generates a constant force  $A_t = 3330 \text{ N}$  at  $A$ . Determine (i) the angular acceleration of the links; (ii) the angular velocity of the links; (iii) the force  $B$  in the link  $DB$ ; (iv) the force  $A_n$  at the instant when  $\theta = 30^\circ$ .

