淡江大學八十七學年度碩士班入學考試試題

系別： 機械工程學系　　　　科目： 動力學

1. The bag A, having a weight of 6 lb, is released from rest at the position $\theta = 0°$, as shown in Fig. 1. It strikes an 18-lb box B when $\theta = 90°$. If the coefficient of restitution between the bag and box is $e = 0.5$, determine the velocities of the bag and box just after impact.   25%
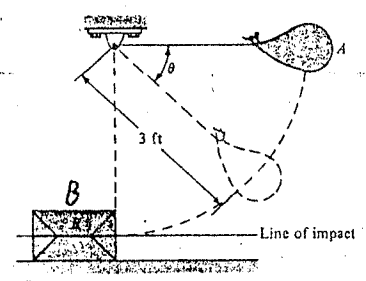

Fig. 1

2. The slender rod AB shown in Fig. 2 has a constant cross section and a mass of 10 kg. As a result of the rotation of crank C, rod AB oscillates in a vertical plane. In the position shown, the angular velocity ω of rod AB is 10 rad/s clockwise and and its angular acceleration α is 40 rad/s² counterclockwise. Determine the force exerted by the link between the rod and the crank. Also, determine the force exerted on rod AB by the pin at support A.   25%
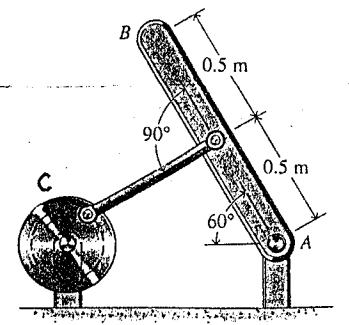

Fig. 2

3. Crank AB has a constant angular velocity of 12 $^{rad}/s$ clockwise. Determine the angular velocity of rod BD and the velocity of collar D when (a) $\theta = 0$, (b) $\theta = 90°$, (c) $\theta = 180°$.　　　　25%
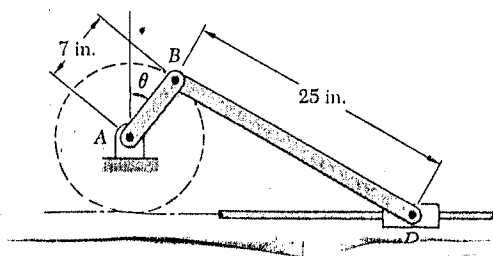

Fig.3

4. A space tug (拖船) describes a circular orbit of 6000-mi radius around the earth. In order to transfer it to a larger circular orbit of 24,000-mi radius, the tug is first placed on an elliptic path AB by firing its engine as it passes through A, thus increasing its velocity by 3810 mi/hr. By how much should the tug's velocity be increased as it reaches B to insert it into the larger circular orbit?
進入

　　註： 地球半徑 R = 3960 mile , 1 mile = 5280 ft.

補充 說明：拖船繞著半徑6000英里的圓形軌道，要增加速度3810mi/hr
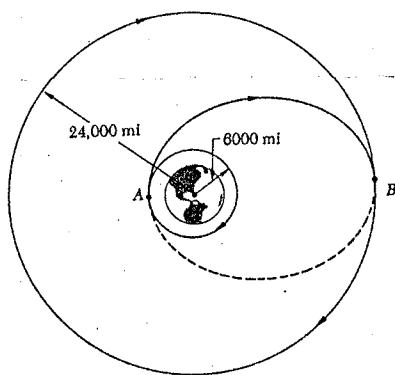　　　　才能進入橢圓形軌道AB，到達B處時要增加速度多少才能進
　　　　入半徑24,000英里的圓形軌道？　　　　25%

Fig.4