國立臺北科技大學 101 學年度碩士班招生考試

系所組別：1511 自動化科技研究所甲組

第二節　工程力學　試題（選考）

注意事項：

1. 本試題共五題，配分共 100 分。
2. 請標明大題、子題編號作答，不必抄題。
3. 全部答案均須在答案卷之答案欄內作答，否則不予計分。

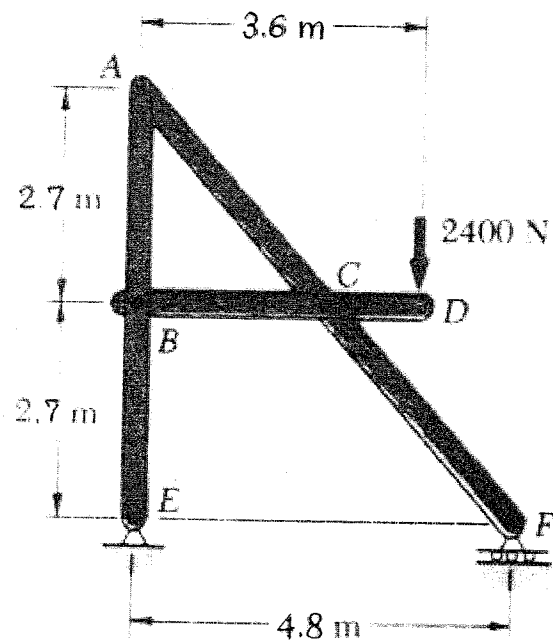一、Determine the components of the forces acting on each member of the frame as shown in Fig.1. **(20%)**

Fig. 1

二、The rod OA, shown in Fig.2, is rotating in the horizontal x-y plane such that at any instant $\theta = t^3$ rad. At the same time, the collar B is sliding outward along OA so that $r = 100t^2$ mm. If in both cases t is in seconds, determine the velocity and acceleration of the collar when t= 1 s. **(20%)**
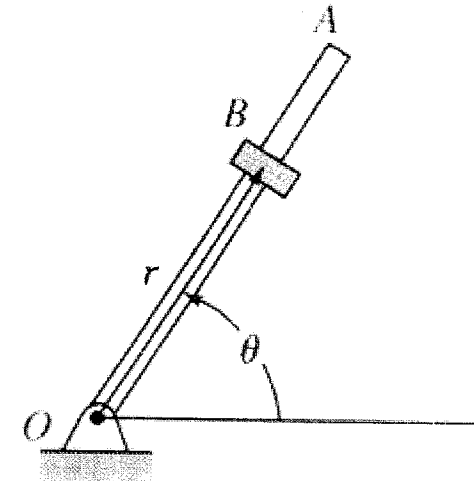

Fig. 2

三、A smooth 2-kg collar C, shown in Fig. 3, fits loosely on the vertical shaft. If the spring is unstretched when the collar is in the dashed position A,

1. determine the speed at which the collar is moving when y=1 m, if it is released from the rest at A; **(10%)**

2. determine the speed at which the collar is moving when y=1 m, if it is released at A with an upward velocity $v_A = 2 m/s$. **(10%)**
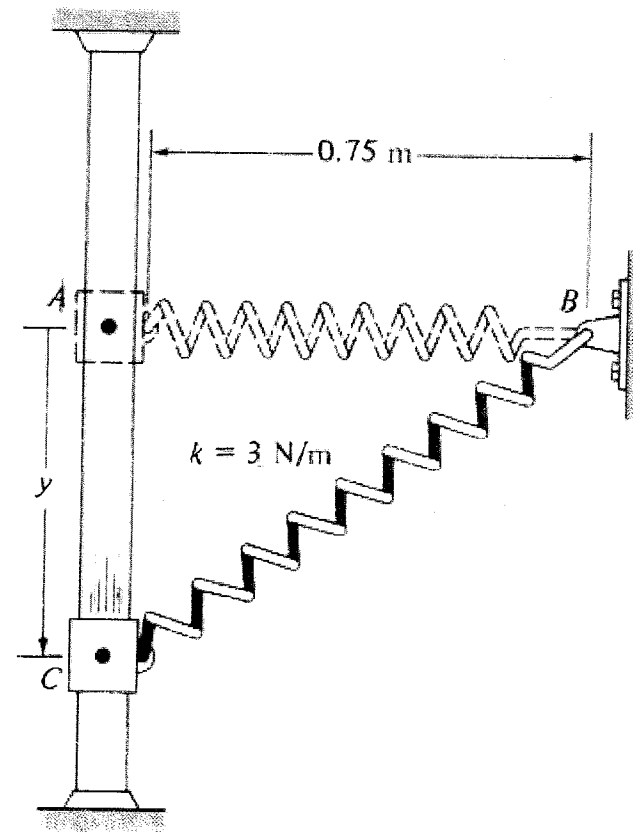

Fig. 3

注意：背面尚有試題

四、 The link shown in Fig. 4 is guided by two blocks at A and B, which move in the fixed slots. If the velocity A is $2\,m/s$ downward, determine the angular velocity of the link and the velocity of B at the instant $\theta = 45^o$. (20%)
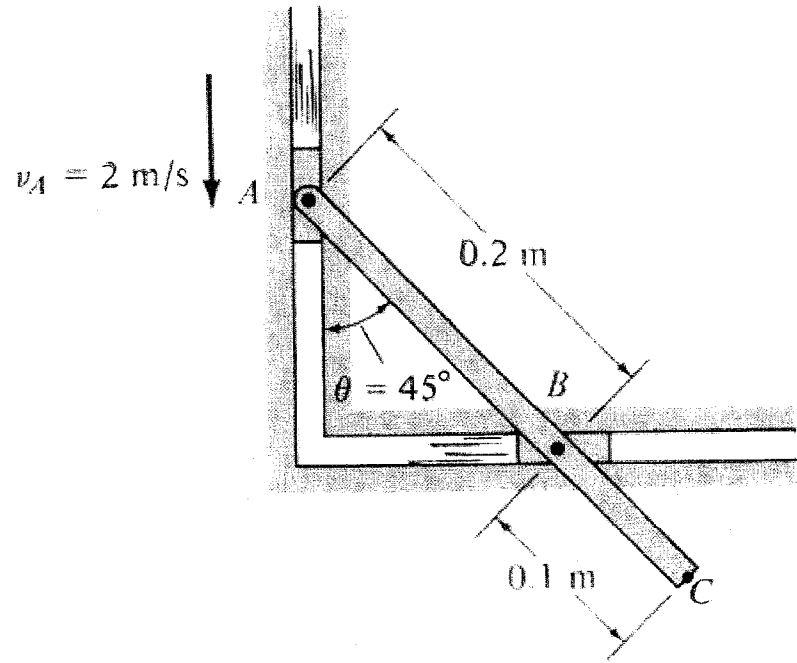

Fig. 4

五、 The rod AB, shown in Fig. 5, rotates clockwise such that it has an angular velocity $\omega_{AB} = 2\,rad/s$ and angular acceleration $\alpha_{AB} = 4\,rad/s^2$ when $\theta = 45^0$. Determine the angular motion of rod DE at this instant. The collar at C is pin-connected to AB and slides over rod DE. (20%)
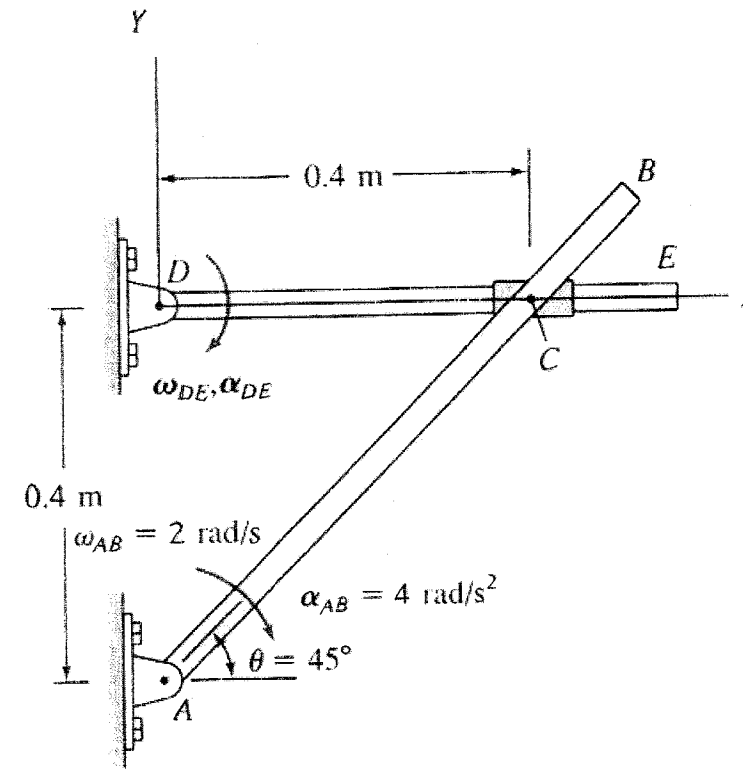

Fig. 5