【說明：試題共 5 題，每題 20 分，總分 100 分。】

1. If the bending moment at point B of the beam shown in Fig. 1 has a magnitude of 28 kN·m and causes compression on the upper part of the beam, determine the shear force and the bending moment on the transverse cross section at point C.

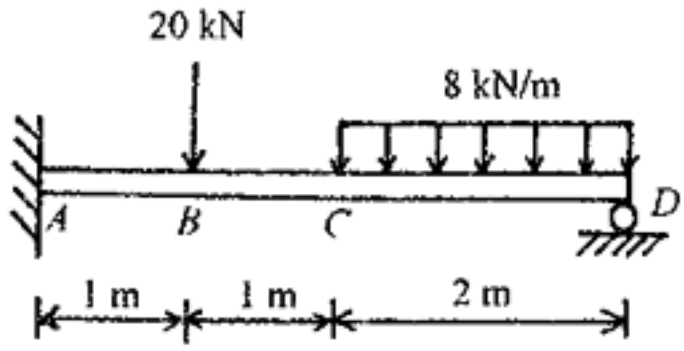

Fig. 1

2. A uniform square plate is supported by a hinge and two cables as shown in Fig. 2. Points A and C are on the xz- and yz-planes, respectively. The weight force of the plate acts along the negative z-direction. If the tension forces in cables AB and BC are both 400 N, determine the weight of the plate.

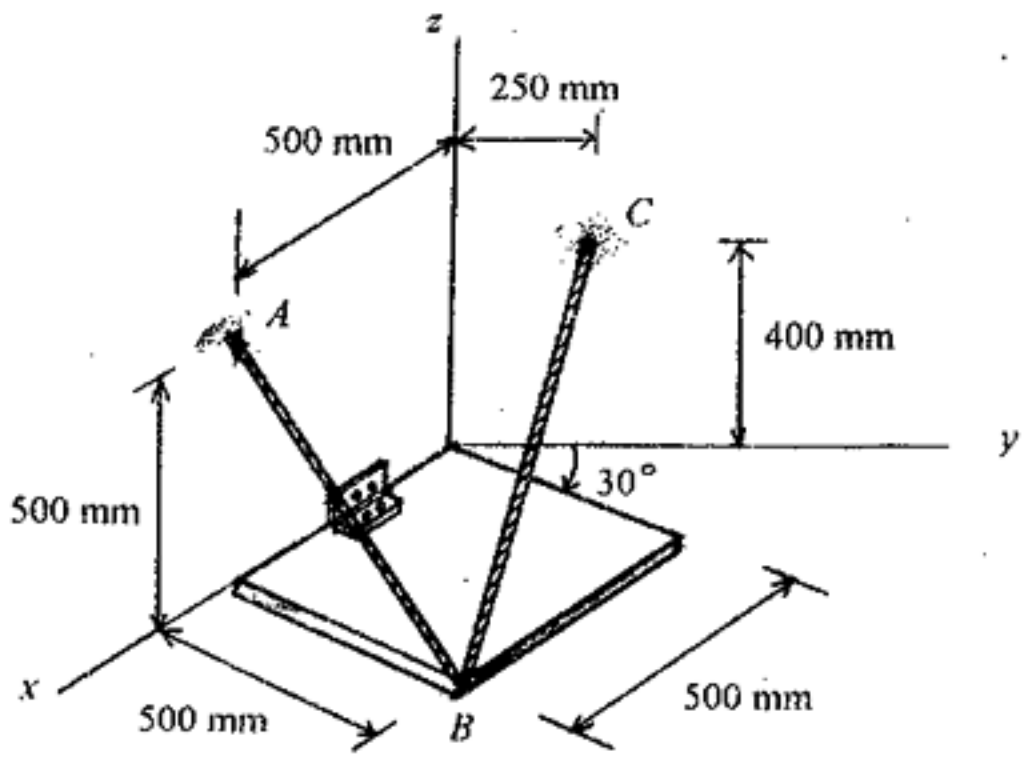

Fig. 2

3. Determine the maximum and minimum moments of inertia of the area shown in Fig.3 with respect to the axes through the centroid of the area.

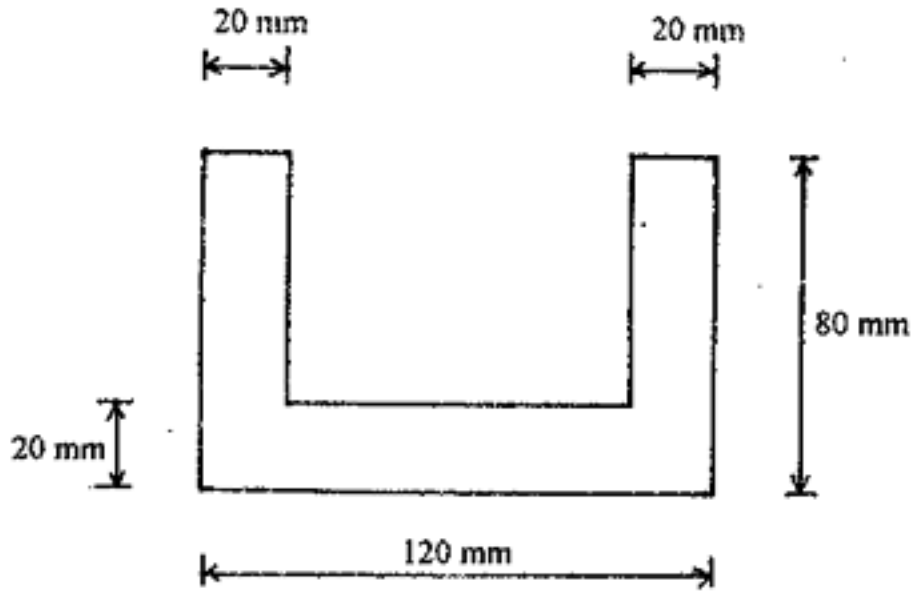

Fig. 3

4. Members *ABC*, *ADE* and *BDF* of the frame shown in Fig. 4 are pin-connected at points *A*, *B* and *D*. Determine all forces acting on member *ADE* .

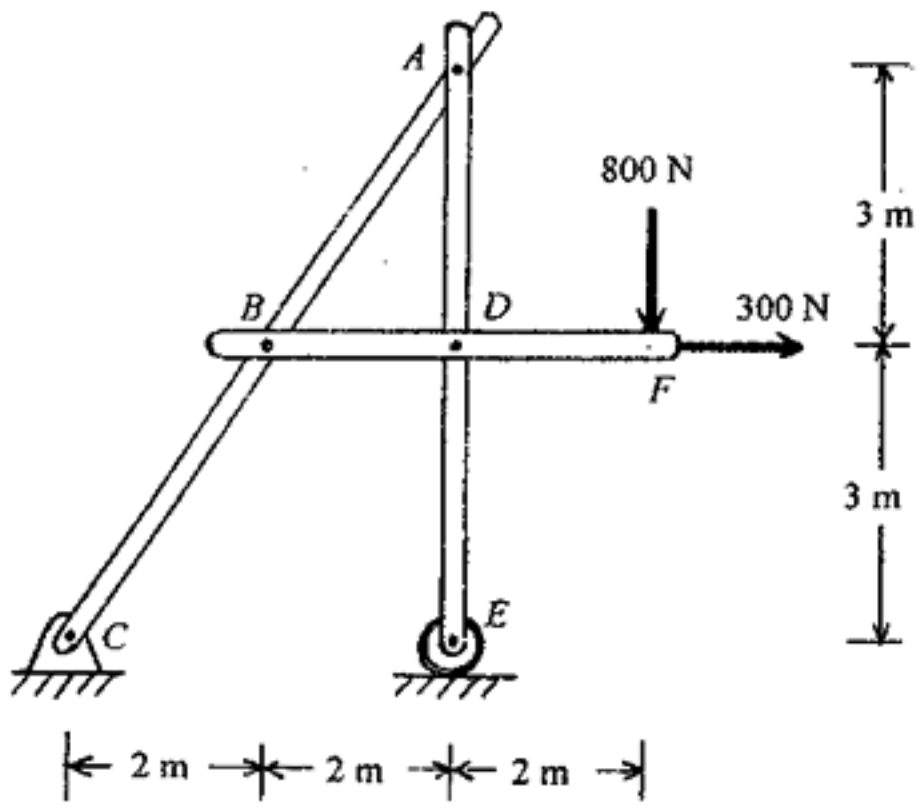

Fig. 4

5. The pin-connected mechanism shown in Fig.5 is constrained by a hinge at *B* and a roller at *A*. At the instant shown, roller *A* has a constant velocity of 0.1 m/s up the slot, determine the velocity and acceleration of the pin *F* at this instant.

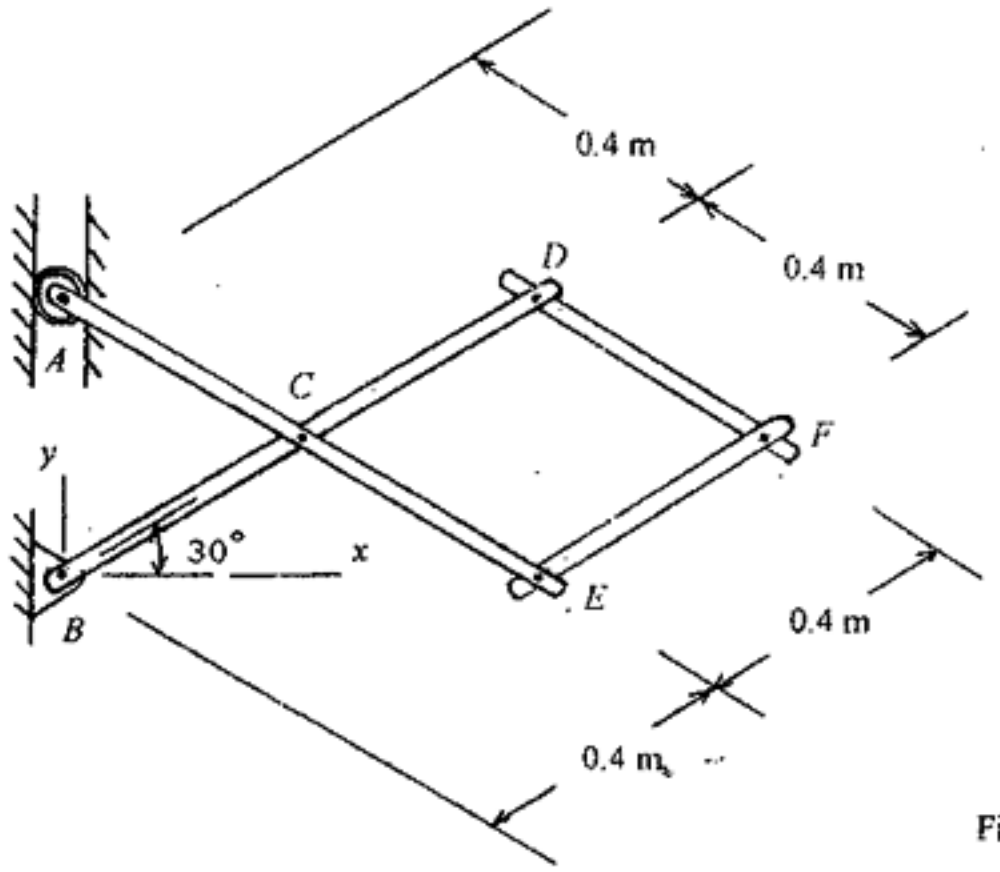

Fig. 5