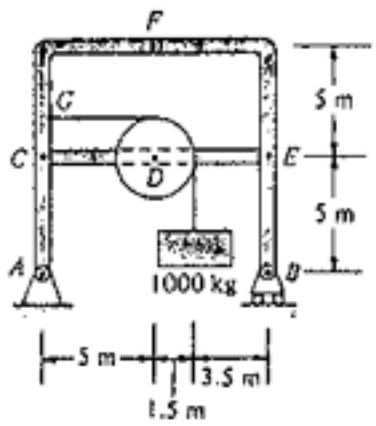
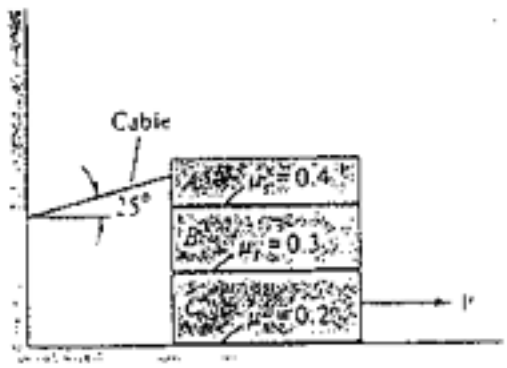
1.(20%)Determine the forces acting on each member of the frame shown



2.(20%)Blocks A, B, C weigh 200N, 400N, and 600N, respectively. Determine the magnitude of the smallest force P required to move block C.



(背面仍有題目,請繼續作答)

3. **(10%)** A 75 g projectile traveling at 600 m/s strikes and becomes embedded in the 50 kg block, which is initially stationary. Compute the energy lost during the impact. Express your answer as an absolute value $|\Delta E|$ and as a percentage n of the original system energy E.

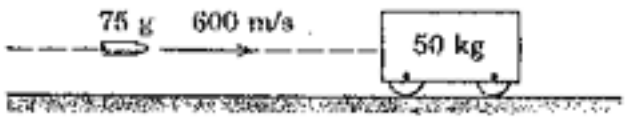


Figure 3

4. **(15%)** The 10 kg slider A moves with negligible friction up the inclined guide. The attached spring has a stiffness of 60 N/m and is stretched 0.6 m in position A, where the slider is released from rest. The 250 N force is constant and the pulley offers negligible resistance to the motion of the cord. Calculate the velocity v of the slider as it passes point C.

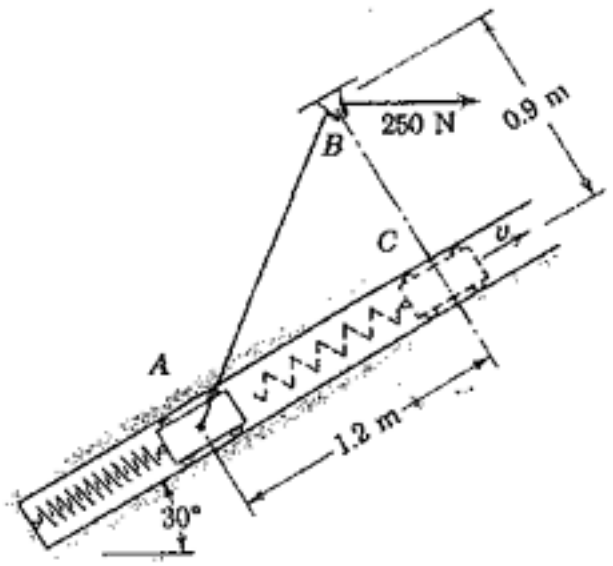


Figure 4

5. **(20%)** The circular disk of 200 mm radius has a mass of 25 kg with centroidal radius of gyration $\bar{k}$ =175 mm and has a concentric circular groove of 75 mm radius cut into it. A steady force T is applied at an angle θ to a cord wrapped around the groove as shown.
   (a) If T=30 N, θ =0, μ_s =0.10, and μ_k =0.08, determine the angular acceleration α of the disk, the acceleration a of its mass center G, and the friction force F that the surface exerts on the disk.
   (b) Repeat problem (a), except let T=50 N and $\theta = 30^0$.

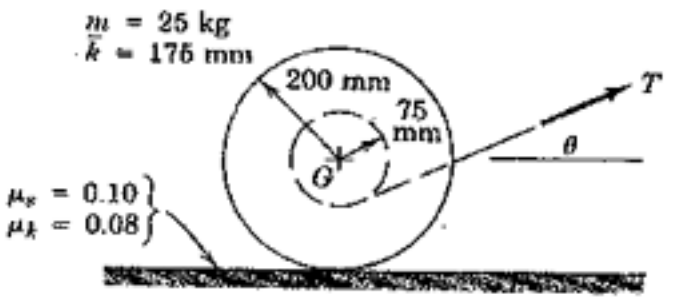


Figure 5

6. **(15%)** The pin A of the hinged link AC is confined to move in the rotating slot of link OD. The angular velocity of OD is $\omega = 2$ rad/s clockwise and is constant for the interval of motion concerned. For the position where $\theta = 45°$ with AC horizontal,
   (a) determine the velocity of pin A and the velocity of A relative to the rotating slot in OD.
   (b) determine the angular acceleration of AC and the acceleration of A relative to the rotating slot in arm OD. **(Note: In order to save your time, just write down the solution procedure. You do not need to solve it (problem 6(b)) completely!)**

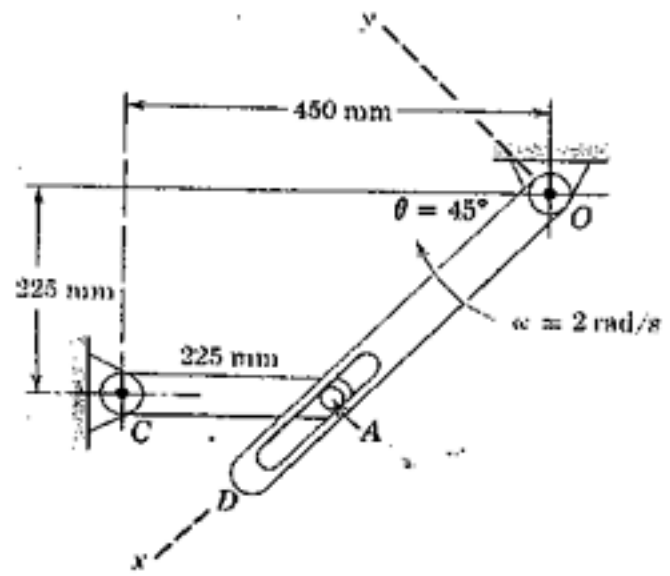


Figure 6