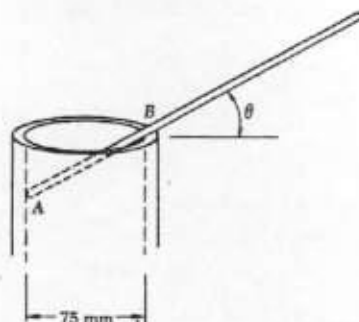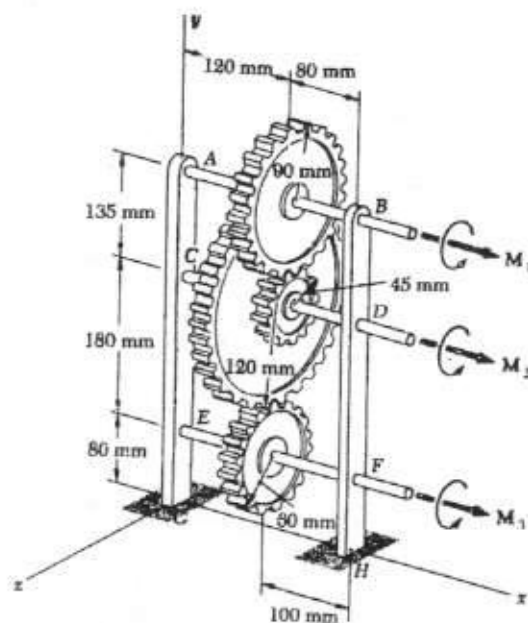●不可使用電子計算機

1. For the rod of length 500 mm rest on the pipe as shown in the following diagram, derive the solution formula and explain how to determine the maximum angle that the rod will not drop into the pipe. (Make whatever assumptions you desired while deriving the equations.)　(25%)

2. All the shafts in following gear system are supported by frictionless bearings.　If M_1=24N-m and M_2=0, Find :
   (a) The required moment M_3 to keep the system in balance. (15%)
   (b) Reaction moments at G and H. (10%)
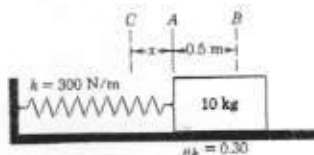
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3. The 10 kg block is released from rest on the horizontal surface at point B where the spring has been stretched a distance of 0.5 m from its neutral position A. The coefficient of kinetic friction between the block and the surface is 0.3. Calculate (a) the velocity of the block as it passes point A (10 %); (b) the maximum distance to the left of A which the block goes (15 %).

4. When the forward speed of the truck was 9.1 m/s, the brakes were suddenly applied, causing all four wheels to stop rotating. It was observed that the truck skidded to stop in 6 m. Determine (a) the acceleration of the truck (5 %); (b) the coefficient of kinetic friction between the wheels and floor (5 %); (c) the magnitude of the normal reaction and the friction force at each wheel in terms of the weight W of the truck (15%).