AE 262 DYNAMICS

2013-2014 SPRING SEMESTER

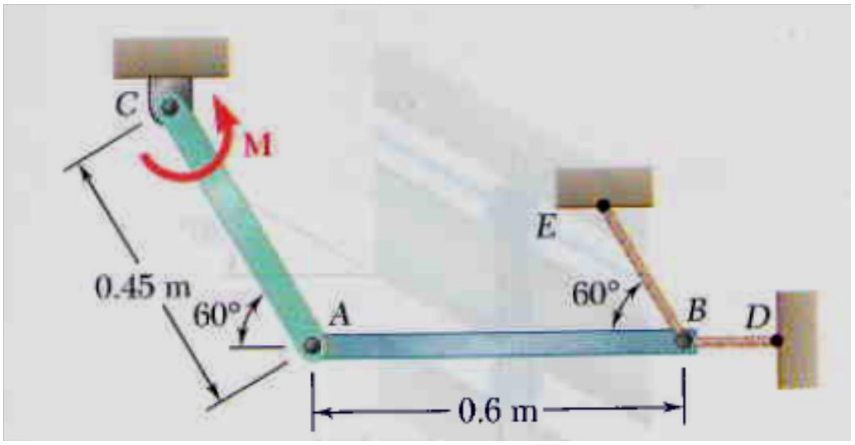
HOMEWORK #4

Given: 17.04.2014

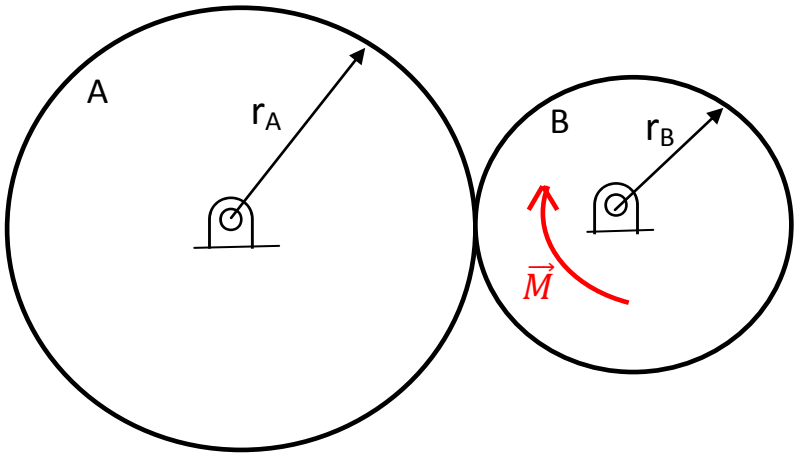
Due: 28.04.2014 at 18.00

Submit to: Oğuz K. Onay, Room 003

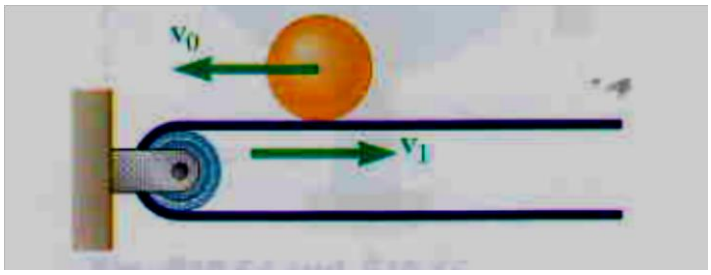
1-) A 4-kg uniform slender rod AB is held in position by two ropes and the link CA which has a negligible weight. After rope BD is cut the assembly rotates in a vertical plane under the combined effect of gravity and a 6 Nm couple $\vec{M}$ applied to link CA as shown. Determine immediately after rope BD has been cut, (a) the acceleration of rod AB, (b) the tension in rope EB.



2-) The mass and radius of friction disk A are m_A=5.4 kg and r_A=15.2 cm; the mass and radius of friction disk B are m_B=2.7 kg and r_B=10.2 cm. The disks are at rest when a couple $\vec{M}$ of moment 84.7 N.cm is applied to disk B. Assuming that no slipping occurs between the disks, determine (a) the angular acceleration of each disk, (b) the friction force that disk A exerts on disk B.



3-) A sphere of radius *r* and mass *m* has a linear velocity $\overrightarrow{v_0}$ directed to the left and no angular velocity as it is placed on a belt moving to the right with a constant placed velocity $\overrightarrow{v_1}$. If after first sliding on the belt the sphere is to have no linear velocity relative to the ground as it starts rolling on the belt without sliding, determine in terms of v_1 and the coefficient of kinetic friction μ_k between the sphere and the belt (a) the required value of v_0, (b) time t_1 at which the sphere will start rolling on the belt, (c) the distance the sphere will have moved relative to the ground at time t_1.



4-) Two slender rods, each of length l and mass m, are released from rest in the position shown. Knowing that a small frictionless knob at end B of rod AB bears on rod CD, determine immediately after release (a) the acceleration of end C of rod CD, (b) the force exerted on knob B.