INS2311 DYNAMICS HOMEWORK 20/12/2022

Submission Deadline: 27/12/2022 14:00 (only online submission is accepted. No email !!!)

**1)** A block of mass M is constrained by rollers to motion in the $x$ direction. A small mass *m* is attached at point B to the end of massless rigid arm. The other end of the arm is attached at a point A which is fixed to the cart. Together the arm and mass make up a rotor which rotates about an axis fixed at A to the cart. The angle the arm makes with a horizontal reference passing through A is given by $θ=ωt$. The length of the arm is “*e*”, the distance from A to B. The position of the cart in the inertial frame is given by the coordinate $x\vec{i}.$ Find the horizontal component of the force on the mass M exerted by rod AB at $t=2s$. ($M=a, m=b \left(kg\right),ω=axb \left(\frac{rad}{s}\right), e=b $)

Note: $a$ and $b$ are the last two digits (ID: XXXXXXab). if student ID is 20160284 a=8 and b=4. If either $a$ or $b$ is zero then take it as 2.



Answer:

**2)** A ramp rolls without friction on a horizontal floor. A crate is released from rest at point A near the top of the ramp, determine the distance the ramp moves with respect to the floor when the crate slides 15 m down the ramp to point B. ($M\_{ramp}=a, M\_{create}=b kg$)

Note: $a$ and $b$ are the last two digits (ID: XXXXXXab). if student ID is 20160284 a=8 and b=4. If either $a$ or $b$ is zero then take it as 2.



15m

Answer: