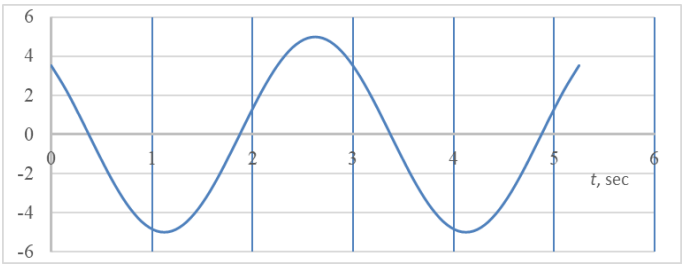
College of Maritime Engineering and Marine Sciences

Ship Vibrations

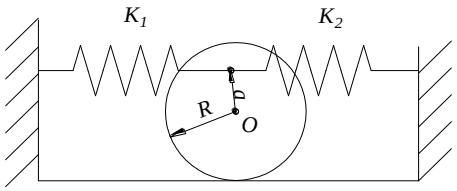
First Evaluation – Oscillation 1 dof **November 28th, 2019**

Student: .....

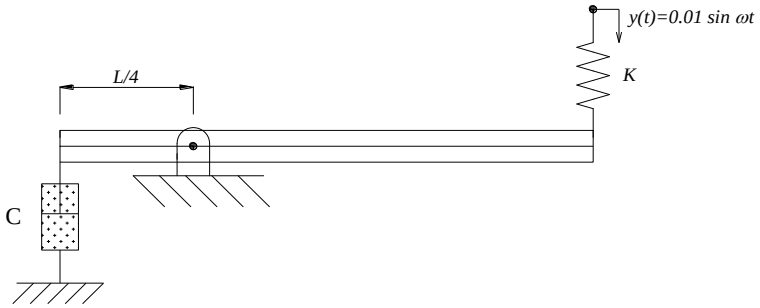
1. Consider the following harmonic function which expresses the vertical displacement of a ship, meters. Present it in the following format: $A\cos\omega t + B\text{sen}\,\omega t$. (15)



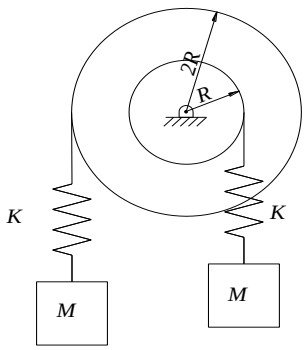
2.- Applying energy method, deduce the equation of motion of the following system composed by a disk which moves with no slipping, and two springs connected *a* units from the center.
(20)



3.- Determine the response function of the 10 kg of mass and 1.2 m in length pinned rigid bar shown in the figure. It has a spring, *K*=2.0E5 N/m on its right end whose upper end develops a motion: *0.01 sin ωt* [m], and a damper, *C*=400 N s/m on its left end; frequency of excitation is 350 rad/sec. The bar has uniformly distributed mass. (35)



4.- Deduce the equations of motions in free oscillation of the following system composed of a rotor which has two pulleys, from which two blocks hang through springs. Consider that the motions have small amplitudes, and express you answer in matrix form. (30)



jrml/2019

I certify that during this exam I have complied with the Code of Ethics of ESPOL.

.....