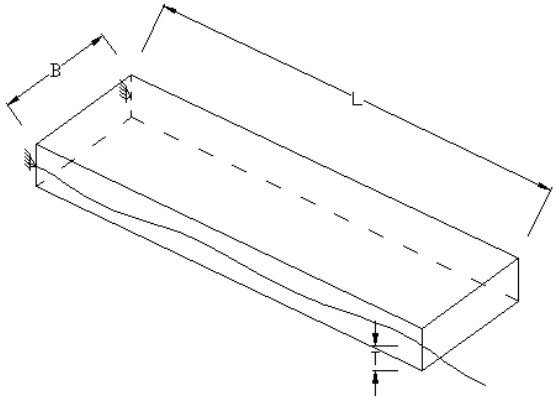
College of Maritime Engineering, and Biological, Oceanical and Natural Resource Sciences

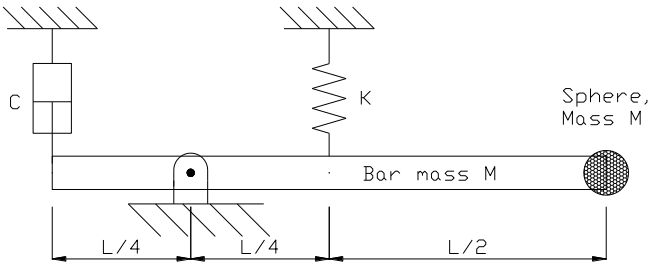
First Evaluation – Ship Vibrations **June, 2016**

Student: .....

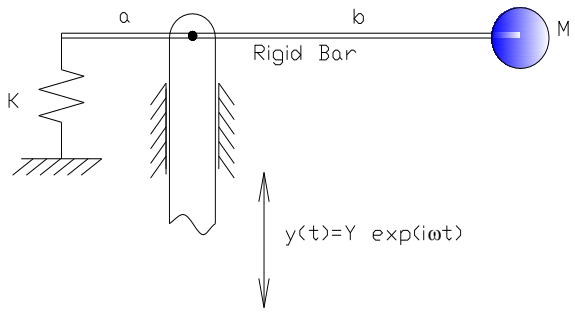
1.- Consider a floating dock, which pivots on one ends, as shown in the figure. Main dimensions are: L: 10 m, B: 3 m, y T: 0.50. Calculate the restoring moment per radian of rotation. (20)



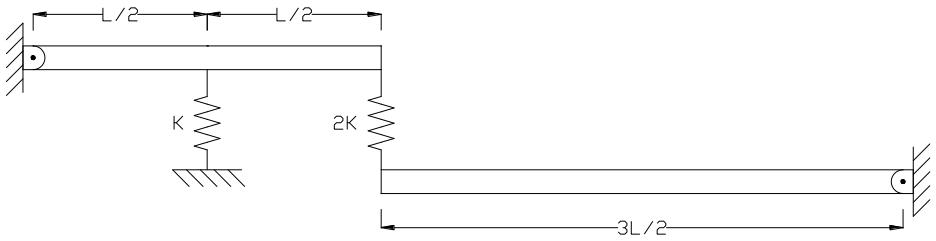
2.- You are asked to write an expression for the motion of the slender rigid bar shown in the figure, that starts its motion with an angle of 5º; express your answer with the amplitude in complex format. Main characteristics of the system are: M_{bar}=M_{sphere}= 2 kg, L= 80 cm, K= 20000 N/m, and C= 300 N s/m. (25)



3.- A model to analyze the system to operate valves is depicted in the following figure. The massless actuator ("lifter") moves vertically with harmonic motion, *y(t)*. Determine the amplitude of the resulting motion. (25)



4.- Deduce the equations of motion of the following system formed by two rigid bars both of uniform mass per unit length, *m*, pinned on its extreme ends, and with two springs connected in the following manner. Calculate its natural frequencies and mode shapes. Finally, plot mode shapes. (30)



jrml/2016

I certify that during this exam I have complied with Code of Ethics of our university.

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