INDUSTRIAL ELECTRONICS – EXAM 26th SEPTEMBER 2013

Candidate Name and Surname …………………………………………………………………..

Registration N° ………………………………………………………………………………….
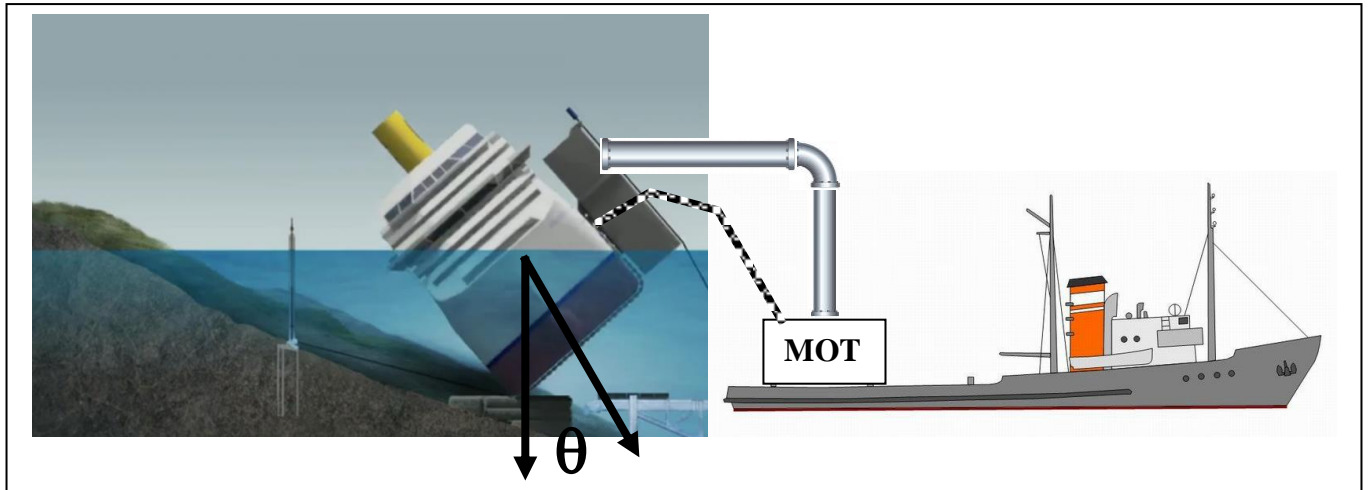
A ship that is inclined on a coast after a shipwreck is straigthened vertically by a system with the following characteristics:

- motor for the movement with frequency response constant;

- Friction, inertia in the motor, delays negligible;

- small variations in the angle θ.

The motor exerts a drawbar action of the right side of the ship where a big size Tube has been mounted. The Tube is filled with liquidi through a gate-valve controlled by the motor itself.

The system will straighten vertically the ship with small rotations due to the combination of the drawbar and filling action as shown in the figure.
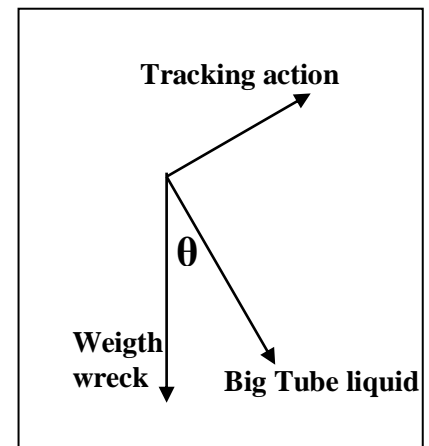
1. Draw the block scheme of the acquisition/regulation chain identifying the input and output variables in every block and in particular the process variable.
2. Calculate the transfer function of the process highlighting what variable must be known.
3. Plot the Bode diagram of the loop function (process + actuator) discussing the eventual problems in terms of stability/instability.
4. Describe a transducer that allows to measure the inclination of the ship with a error equal to 3%
5. Explain how a cascade control works