EE462 – Laboratory

Exp. 3 Quiz **Group #1** **25.05.2017**

Name: **Duration:** 15 min

ID: **Grade:** …../30

Questions

Part I: Understand

(10 pts) Using only the data you have taken during the experiment, explain how you can calculate the **motor drive efficiency**, **motor efficiency** and **overall efficiency** at a given operating condition.

Part II: Solve

Consider an electric freight train weight of which is 1000 tons. The train is going on a level track (straight rail) with 70 km/h speed. The diameter of each wheel is 0.7 m. The total mechanical output power of the traction motors is 5 MW. Neglect friction and windage throughout the question.

(5 pts) How much time does it take for the train to stop, if rated torque is applied in reverse direction during deceleration?

(5 pts) How much distance should the train leave before starting the deceleration?

Part III: Think

(10 pts) A traction load is typically composed of three torque components:

- Constant torque due to gravity**:** $\mathbf{T_1 = K_1}$
- Torque increasing linearly with speed due to friction: $\mathbf{T_2 = K_2\,\omega}$
- Torque increasing with the square of speed due to drag force: $\mathbf{T_3 = K_3\,\omega^2}$

Suppose that you are given the torque data against speed (as you have taken during the experiment), from zero speed to rated speed. Propose a method to determine the coefficients given above. Give detail as much as possible.