Name: **Duration:** 15 min

ID: **Grade:** …../30

Questions

Part I: Understand

(5 pts) What would happen if you kept the motor in braking region for a long time and did not have the braking resistor in the experiment?

(5 pts) Propose a method which can solve this problem and does not require the braking resistor. Explain your reasoning.

Part II: Solve

(10 pts) Suppose that, in the crane-hoist system, V/f control is applied with f = 50 Hz and the system is operating in upwards direction at steady state. Sketch the torque speed characteristics of the motor along with the load and shown the operating point.

Suppose now that the frequency is changed to 40 Hz suddenly (with V/f control). During the transition between the previous state and the new steady state (neglect electrical time constant):

What is the direction of the motor torque?

At which quadrant does the motor operate?

Draw the new torque speed curve on the same graph and show the new operating point.

Sketch the transition during the transient period, on the same graph.

Part III: Think

(10 pts) Consider the measurements you took during the experiment. Propose a method to find inertia seen by the motor. Neglect inertia of the gearbox and wheel.