Name: **Duration:** 15 min

ID: **Grade:** ...../30

Questions

Part I: Understand

(6 pts) Compare the *DOL* control method with *VFD control* in different aspects, specifically for the Crane-hoist system.

(4 pts) When you want to change the direction of the tank from upwards to downwards and apply accordingly in the experiment, how does the motor drive achieve this? In other words, what should the motor drive inverter do, to change the direction?

Part II: Solve

(10 pts) Suppose you have an induction motor rated values of which are as follows.

P = 4 kW, $V_{l\text{-}l}$ = 400 V, f = 50 Hz, N = 1440 rpm, pole = 4

Calculate:

Synchronous speed of the motor.

Rated slip of the motor.

Rated torque of the motor.

The frequency of the rotor induced currents at rated conditions.

The minimum required DC link voltage of the drive inverter, in case *Space Vector PWM* technique is used.

Part III: Think

(10 pts) Suppose that the crane hoist system is operating at constant speed in upwards direction. Suppose also that you are able to measure the motor power output and the linear speed of the tank. Propose a method to calculate the total mass of the tank.