**MIDDLE EAST TECHNICAL UNIVERSITY**

**ELECTRICAL AND ELECTRONICS ENGINEERING DEPARTMENT**



**EE463 STATIC POWER CONVERSION-I**

**PROJECT #3 REPORT**

**Due Date: 05.01.2019**

**Team Members**

**Ali AYDIN 2093326**

**INTRODUCTION**

In this project, we examine some converter topologies which are three phase rectifier, buck and boost converter. Firstly, we fed a dc machine with three phase controlled rectifier by using simulink and we added the speed controller to motor. We controlled the speed with pi controller. Therefore, we observed overshoot in speed graph and motor reached to steady state. In the second part of the project, we designed a buck converter for specified input and output voltage in the Simulink. Thus, we chose the components of this converter with respect to component`s datasheet and made cost analysis. In third part of the project, we designed a boost converter in WEBENCH.

**Question 1-)**

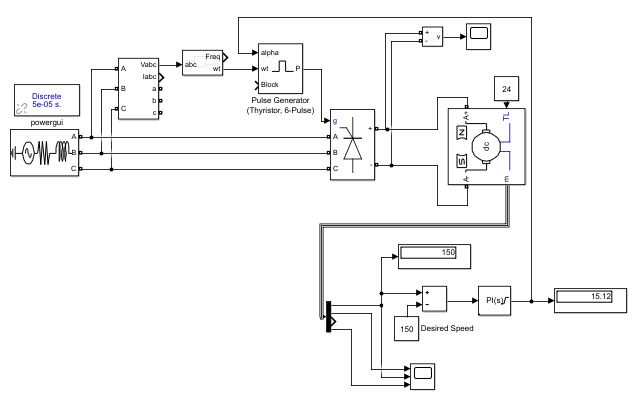


Figure 1: Setup for question 1

As seen in the figure 1, we feed a dc machine with three phase thyristor rectifier. In this question, we design a speed controller with pi controller block. Firstly, to examine the pi controller, we tried with two different desired speed which are 150 and 75 rad/sec in the figure 2 and 3, respectively. Those graphs consist of three different output which are armature current, speed and electrical torque. In the beginning of the graphs, armature current is too high since we give 522 Vdc and motor tries to accelerate suddenly. Due to that, motor takes high current. Explanation for the electrical torque is the same with current response. For speed of motor, motor tries to reach steady state and it accelerate suddenly but it cannot reach steady state since we arrange some pi constant and when motor accelerates, some error occur and pi constant tries to decrease this error but it takes time. When the desired speed is 75 rad/sec, there are huge overshoot since we used small integral constant.

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| Figure 2: Speed regulation with 150 rad/sec desired speed | Figure 3: Speed regulation with 75 rad/sec desired speed |

Also, we applied performance test to motor and result is seen in the figure 4.

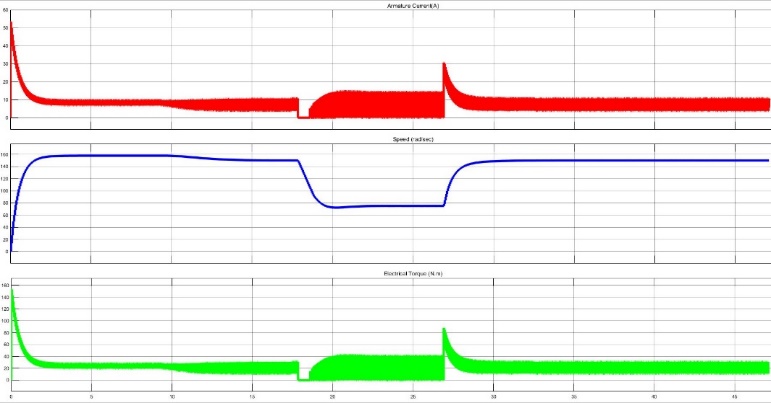


Figure 4: Result for performance test

In performance test, firstly, we arranged the desired speed to 150 rad/sec and we waited to reach motor to steady state. After it reached to steady state, we changed the desired speed to 75 rad/sec. In shorth amount of time, motor reached to steady state since small error occurred from 150 to 75. When it reached to steady state, we changed the desired speed. In shorth amount of time, because of the small error, it reached to steady state.

**Question 2-)**

**Question 3-)**

**Conclusion**