**Assignment 2: Control of a fourth-order model of a synchronous generator with excitation and torque using PID and State-feedback controllers**

**Introduction:** You can use the MATLAB/SIMULINK to model and simulate the performance of a synchronous generator with its excitation and mechanical torque following 3-phase short-circuit. Then design a PID controller and state-feedback controller to achieve optimum transient performance.

**Objectives:**

* Derive the fourth-order model of the system.
* Use the MATLAB to find:

1. The load angle and voltage responses without excitation and torque control
2. The load angle and voltage responses with excitation and torque control

* Using PID controller to achieve overshoot less than 10%, steady state error less than 2%.
* Using state-feedback controller to achieve overshoot less than 10%, steady state error less than 2%.

1. Compare and discuss the results.

**Resources:**

Lecture notes 2020-21

