KING FAHD UNIVERSITY OF PETROLEUM & MINERALS

ELECTRICAL ENGINEERING DEPARTMENT

PROJECT 3

For the state space model of the control system given in the class notes, consider the followings.

Part I

Develop a program to form the matrices A and AC and calculate the eigenvalues of the open-loop and closed-loop systems for the controller parameters given in the class notes.

Part II

For the state space model of the system given in the class notes, consider the objective function as *maximize* (min ζ). Find the best settings of the controller using RCGA and compare the closed loop system eigenvalues under the best controller settings obtained. Consider the following two cases:

1. The constraints are:

$$1.0 \le K \le 100$$
$$0.1 \le T_1 \le 1.0$$
$$0.01 \le T_2 \le 0.1$$

2. Repeat with the constraints:

$$1.0 \le K \le 30$$
$$0.1 \le T_1 \le 0.5$$
$$0.1 \le T_2 \le 0.1$$

You should run GA in each case with different population sizes and crossover and mutation probabilities. Tabulate the results for comparison.

Submission: Due on Monday March 6, 2022