Class: Sistem Pengaturan Berjaringan (EE185524)
Lecturer: Yurid E. Nugraha
Date and Time: 2023/04/13, 07.00–10.00
Rule: Take home

ETS 2022 Genap

Instruction: Problems 1 and 2 are mandatory. You can choose two problems to attempt from Problems 3–7.

1. (**30%**) Choose one paper from this list and make a short review (about 300-400 words) on the characteristics of networked systems that the paper attempts to address.

2. (**40%**) Give a thorough analysis of a closed-loop system with transfer function $\dfrac{5}{s^3+6s^2+7s+9}$ under deadtime delay of one-second delay (**if your NRP is odd**) or three-second delay (**even**). Apply a Smith predictor to address the effect of the delay on the system. Use output responses and Bode plots to explain your results.

3. (**15%**) Draw and explain a block diagram of a networked control system.

4. (**15%**) Explain why in a networked control system the system equation $\dot{x} = Ax + Bu$ may need to be discretized and discuss methods to perform discretization.

5. (**15%**) Explain how the delay and sampling affect *the event-driven* control signal $u(t)$ (or $u(kh)$) in the networked control system with feedback controller.

6. (**15%**) Explain what topological entropy is and how it may be characterize a control system.

7. (**15%**) Discuss whether or not the analysis with delay in e.g., Problem 2 can be applied to nonlinear systems.