

Assignment 1

(1) اللي اتقال في المحاضرة عنه

(Can be done in teams of 2)

In this assignment, we will simulate a heater using Simulink.

- We will implement an ON/OFF controller for the heater.
- The simulation should start with an initial temperature of 25°C, as shown in the slide below since a real-life heater would not start from zero.
- The differential gap (or deadband) is $\pm 2^\circ\text{C}$, meaning the setpoint of 50°C allows a temperature range of [48°C, 52°C].
- The ON/OFF controller has only one parameter: the differential gap, making it a very simple control method.

We should also observe how increasing delay affects both the system's response and its peak-to-peak value.

Deadline: End of November

Assignment 1 Process Simulation



Thermostatic control of temperature is quite common in domestic appliances and in simple industrial processes. A thermostat actuates a relay that switches a heater ON when the temperature is below the setpoint and OFF when it rises above the setpoint.

Simulate an electrically heated water tank (for 30 minutes) if:

At steady state, the water temperature rises by 8°C for every amp of heater current, and the dynamic response of the heater tank can be modelled by a first order lag τ of 9 minutes plus a dead time θ of 0.5 minute. **The initial temperature is 25°C while the heater is OFF.** The setpoint is 50°C. The heater current is 10 amps when the thermostat is energized. The thermostat has a differential gap of 2°C. Repeat if the dead time is 4.5 minutes.

What is the peak-to-peak variation in temperature in each case?

What are your comments?

Assalam Alaikum ya Shabab,

Here are some instructions for **Assignment #2** that must be followed:

1. The Assignment **Deadline** will be **30th November at 11:59 PM**.
2. You can work in **groups of 2 (maximum)**.
3. The **report must include screenshots** of your steps.
4. **Comment on the results** that you get from the simulator.
5. Only **one submission per group** will be accepted.
6. Any **copied reports** will unfortunately result in a **zero** grade.
7. If you have any questions, please add a **class comment** on this announcement so the answer can be shared with other students (no private comments).
8. It is recommended to submit the file in **PDF format**, as it is easier to download from the classroom.
9. You should **name your submitted file** using your own name and your classmate's name.
For example:
Ahmed Amr _ Bilal Ramadan.
10. Your submitted file should include:
 - Your name, section number, and BN
 - Your classmate's name, section number, and BN
11. **Late submission** is for students who cannot submit the assignment before the specified deadline. Do **not** upload your file under this category unless you fail to submit on time.

Best regards,

Ahmed Amr

3) MATLAB installation

بالنسبة لل MATLAB ممكن تاخذه من هارد الكلية أو لو عايز تحمله فتقدر تحمله من [هنا](#) وتمشي مع خطوات ال "read me" file

4) very useful videos on how to use Simulink

- [implementing a PID controller](#)
- [Simulink playlist](#)