Project Briefing

Design Specifications.
The transient response performance specifications for all the outputs y in state space model are as follows:

1) The overshoot is less than 10%.
2) The 2% settling time is less than 20 seconds.

How to verify whether above design specifications are met in SIMULINK?

As you are building the blocks using SIMULINK in MATLAB, it is easy to simulate the step response.

For example, you first design the state feedback controller using pole placement or LQR. $u = -Kx$

When you want to check the step responses of the three outputs, simply apply

$$u = -Kx + r$$

where r are step inputs. Since there are two inputs, you should apply only one step at a time and keep the other one as zero (r=[1,0], or r=[0,1]), and then observe the behavior of the three outputs. So in total, there are six step responses to evaluate, and all of them have to meet above requirement.