

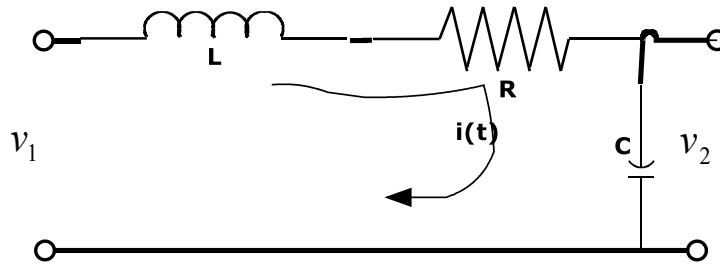
Automatic Control Systems

Sheet (06)

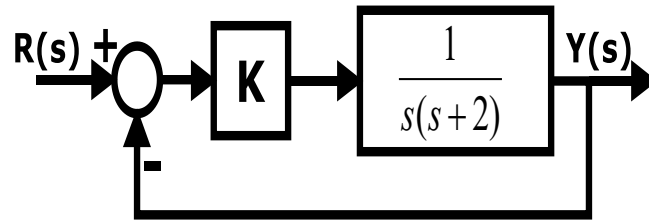
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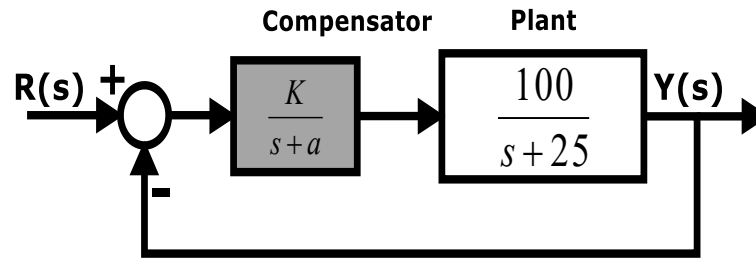
1. For the electric circuit shown below, find the following:
 - a) The time domain equation relating $i(t)$ and $v_1(t)$
 - b) The time domain equation relating $i(t)$ and $v_2(t)$
 - c) Assuming all initial conditions are zero, the transfer function $\frac{V_2(s)}{V_1(s)}$ and the damping ratio ζ and the Undamped natural frequency ω_n of the system
 - d) The values of R that will result in $v_2(t)$ having an overshoot of no more than 25% assuming $v_1(t)$ is a unit step, $L = 10 \text{ mH}$, and $C = 4 \mu\text{F}$



2. For the unity feedback system shown below, specify the gain K of the proportional controller so that the output $y(t)$ has an overshoot of no more than 10% in the response to a unit step



3. For the unity feedback system shown below, specify the gain and pole location of the compensator so that the overall closed-loop response to a unit-step input has an overshoot of no more than 25%, and a 1% settling time of no more than 0.1 sec. verify your design using MATLAB.



- [illegible]