Assignment 1: Step Response of Second Order System

Submit by: 04-03-2021 (Thursday) 1700 hours

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Plot Step Response for OLTF: $w^2_n / s(s + 2 \zeta w_n)$ with unity negative feedback.

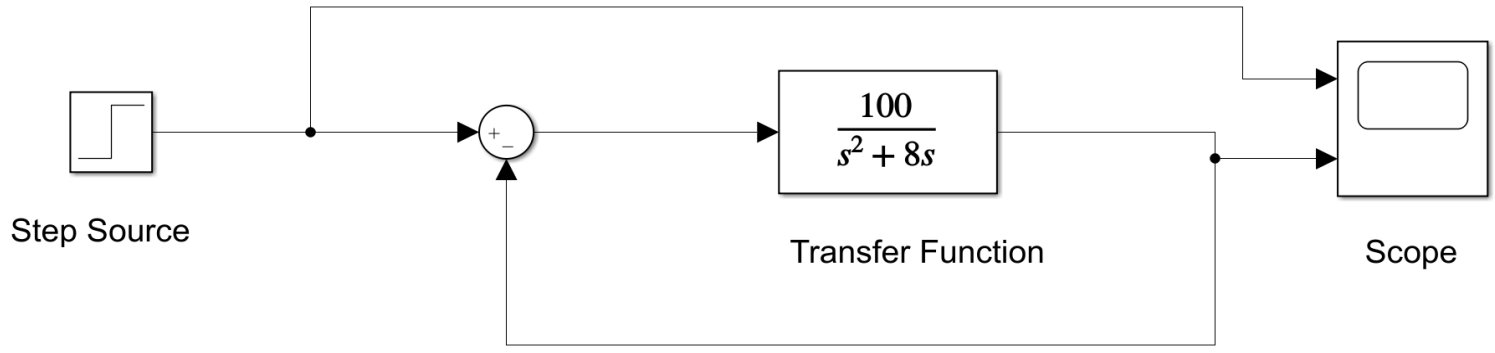
Step Source having magnitude = 1 and step time = 0.

Plot for **ζ = 0.1, 0.2 ,0.3, 0.4, 0.5, 0.6 and w_n = 10 rad/sec and 20 rad/sec. (Total 12 cases)**

For each value of ζ and w_n plot the following graph showing the given parameters:

1. **Rise Time:** The rise time is the time required for the response to rise from 0% to 100% of its final value. **(Take 0% to 100%)**
2. **Maximum overshoot:** The maximum overshoot is the maximum peak value of the response curve measured from unity.
3. **Peak Time:** The time at which the maximum overshoot occurs
4. **Time Period of oscillation (Td):** Time between 2 successive peaks or valleys
5. **Damped Frequency (w_d)**

Sample Model (ζ = 0.4 and w_n = 10 rad/sec):



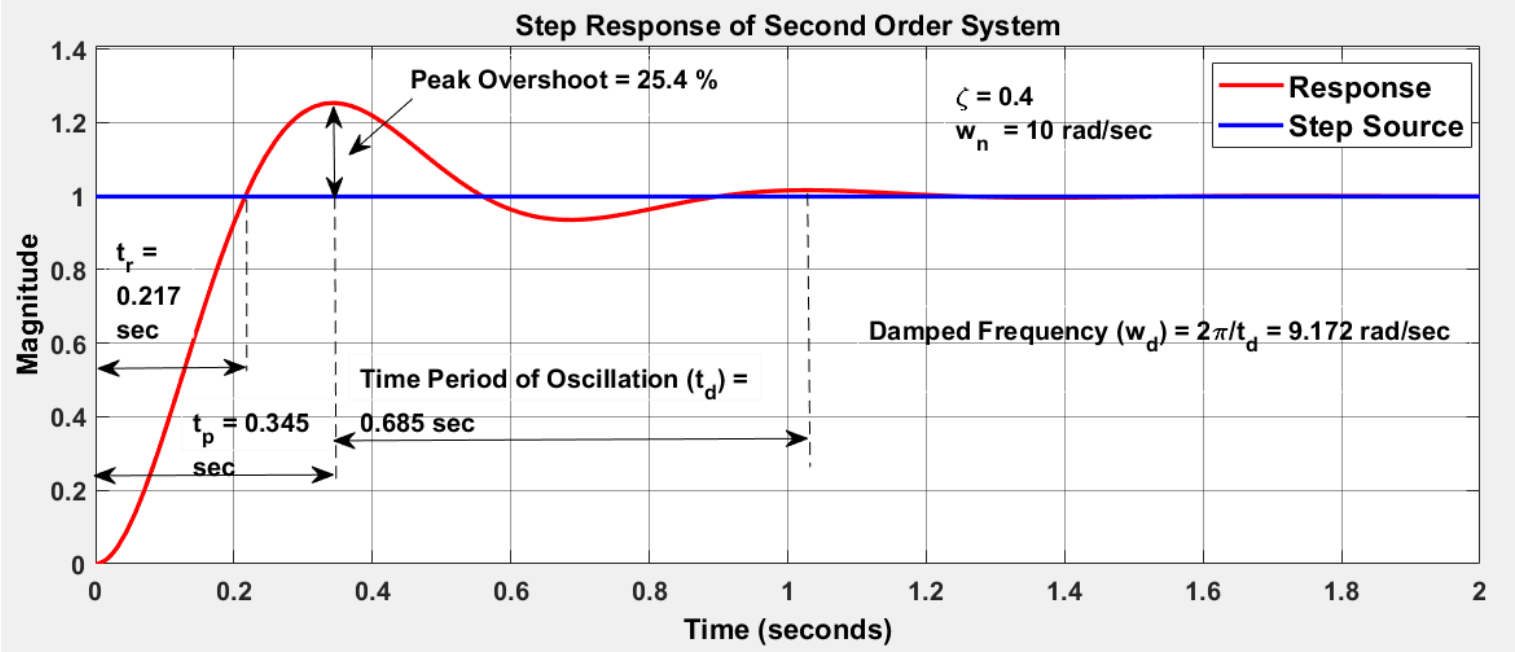
- *Mention your name, entry number on first page of your assignment.*
- *Assignment should have 2 graphs per page. (Total 6 pages for 12 graphs).*
- *Page 7 should contain a table showing the different parameters for all the 12 cases.*
- *Please refer to the following pages for Assignment Format.*
- *Send your PDF file on given email id's with file name being "2020JIDXXXX".*

Name: **Entry No:2020JIDXXXX** **Assignment No: 1**

Case 1:

$w_n = x_1$

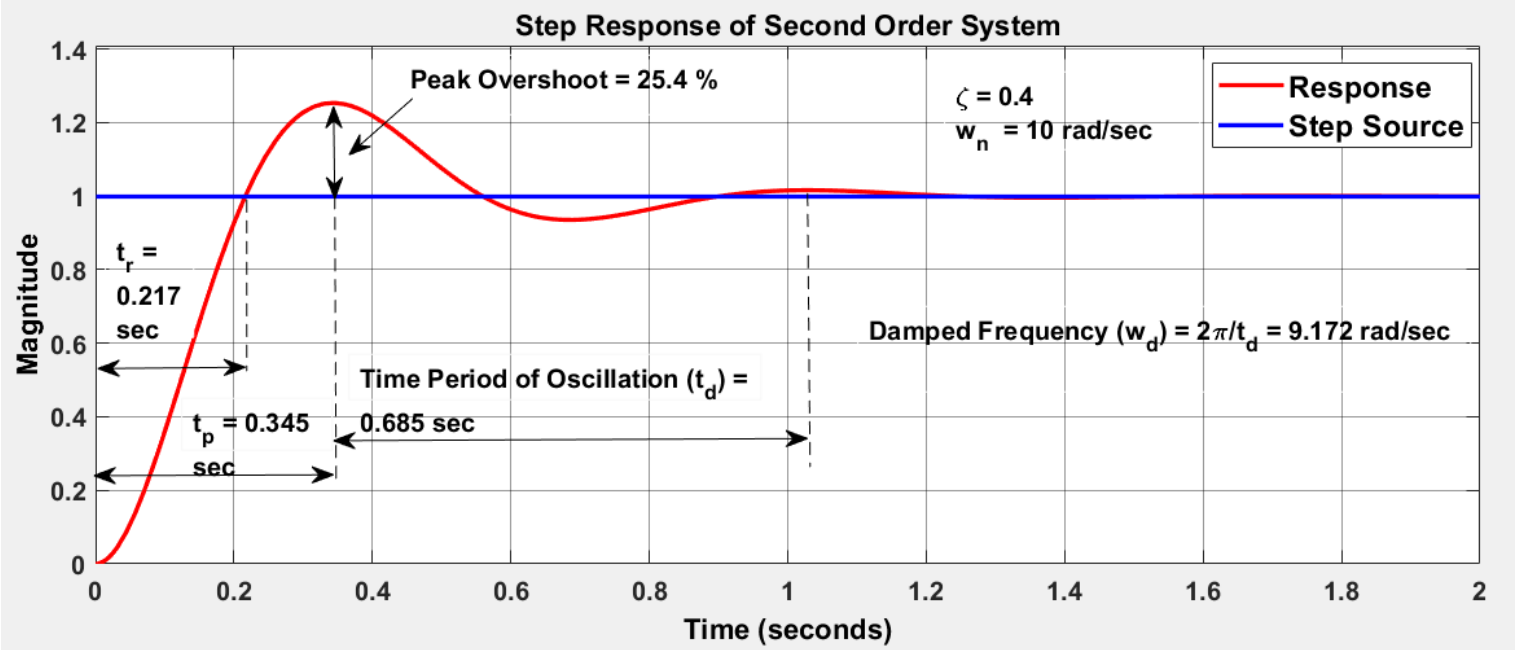
$\zeta = y_1$ *(This is just a sample graph)*



Case 2:

$w_n = x_1$

$\zeta = y_2$ *(This is just a sample graph)*



S. No	w_n	ζ	Rise Time (sec)	Peak Overshoot (%)	Peak Time	Time Period of Oscillations	Damped Frequency (rad/sec)