Assignment 5

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment. Due on 2019-04-03, 23:59 IST.

1) Laplace domain stability analysis for a system with time delay is always approximate.  
   - True  
   - False  

   No, the answer is incorrect.  
   Score: 0  
   Accepted Answers:  
   True  

2) A system with a transfer function $G_p = \frac{1}{s}$ is to be stabilized by using a P controller.  
   Consider that measurement is accurate and instantaneous and valve transfer function is $G_v = \frac{1}{0.1s+1}$. The corresponding controller gain should be  
   - greater than 0  
   - less than 0  
   - greater than 2  
   - less than 2  

   No, the answer is incorrect.  
   Score: 0  
   Accepted Answers:  
   greater than 2  

3) A stable second order system without any delay can be destabilized by a P controller if measurement and valve dynamics are very fast.  
   - True  
   - False  

   No, the answer is incorrect.  
   Score: 0  
   Accepted Answers:  
   True
5) Consider a process with transfer function \( G_p = \frac{1}{(5s+1)(s+1)} \) is controlled by using a P controller with gain of 4. The measurement is accurate but delayed. The maximum value of the measurement delay up to which the controller can be stably operated is __

No, the answer is incorrect.
Score: 0
Accepted Answers:
\( \text{does not exist} \)

6) Which of the following systems under feedback control can result into instability?

- first order lag process with delayed measurement controlled by P controller
- second order process with instantaneous measurement, rst order valve dynamics controlled by P controller
- second order process with instantaneous measurement and valve dynamics controlled by PI controller
- all the above

No, the answer is incorrect.
Score: 0
Accepted Answers:
all the above

7) Consider a plug flow reactor (PFR) whose transfer function is given by \( G_p = e^{-5} \times e^{-10s} \). Valve and measurement dynamics can be assumed to be instantaneous. What value of proportional controller gain would result in sustained oscillations for this PFR? (This gain is known as the ultimate gain)

- 53.71
- 112.85
- 148.41
- 175.21

No, the answer is incorrect.
Score: 0
Accepted Answers:
148.41

8) Nyquist plot for a second order system controlled by a PI controller is shown below.
Based on Nyquist stability criterion, the corresponding closed-loop system will be____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) stable

9) Consider a feedback control system with \( G_p = \frac{2}{s^2 + 5s + 6} \), \( G_v = \frac{10}{s+1} \), \( G_m = \frac{1}{0.1s+1} \), and \( G_c = 0.1(1 + \frac{1}{5s}) \). What would be the cross-over frequency for this system will be

- 2.57 rad/s
- 2.78 rad/s
- 3.14 rad/s
- \( \infty \)

No, the answer is incorrect.
Score: 0
Accepted Answers:
2.57 rad/s

10) Root locus plot for a third order system is shown below. For a P controller gain of 2, the closed-loop system will give rise to

- exponential delay without oscillations
- exponential growth without oscillations
- decaying oscillations
- growing oscillations

No, the answer is incorrect.
Score: 0
Accepted Answers:
decaying oscillations