Continuing Education Course #291
Proportional, Integral, and Derivative
Controller Design - Part 1

1. The PID controller is the sum of how many terms?
   ○ a. 1
   ○ b. 2
   ○ c. 3

2. The proportional term?
   ○ a. sets the loop gain
   ○ b. integrates the error
   ○ c. differentiates the error

3. The integral term?
   ○ a. sets the loop gain
   ○ b. integrates the error
   ○ c. differentiates the error

4. The derivative term?
   ○ a. sets the loop gain
   ○ b. integrates the error
   ○ c. differentiates the error

5. The basic elements of a control loop are?
   ○ a. Plant and Controller
   ○ b. Controller and Feedback Sensor
   ○ c. Plant, Controller, and Feedback Sensor

6. In the basic feedback control loop block diagram the symbols for the plant and controller are?
   ○ a. P plant and H controller
   ○ b. C plant and H controller
   ○ c. P plant and C controller

7. The PID is a specific type of?
   ○ a. plant
   ○ b. controller
   ○ c. feedback sensor

8. Each block of the control loop can be represented in the?
   ○ a. time domain
   ○ b. frequency domain
   ○ c. both

9. The transform often used to convert between the continuous time and frequency domains is?
   ○ a. Bode
   ○ b. Nyquist
   ○ c. Laplace

10. The control loop frequency response can be analyzed using?
    ○ a. Bode Plots and Analysis
    ○ b. Nyquist Plots and Analysis
    ○ c. both
11. Bode frequency plots are used to analyze the?
   - a. Plant frequency response
   - b. Controller frequency response
   - c. The OLTF and CLTF frequency response

12. Key stability criteria derived from Bode and Nyquist plots are?
   - a. gain margin
   - b. phase margin
   - c. both

13. The control loop gain is primarily set by the?
   - a. plant
   - b. controller
   - c. feedback sensor

14. The control loop response from the command input to the output is termed?
   - a. The open loop transfer function
   - b. The sensitivity function
   - c. The closed loop transfer function

15. The open loop transfer function gain is primarily a function of the ________ gain?
   - a. Plant
   - b. Controller
   - c. Feedback

16. Increasing a PID proportional gain K_P will?
   - a. decrease rise time
   - b. increase rise time
   - c. have no effect

17. Increasing a PID integral gain K_I will?
   - a. decrease overshoot
   - b. increase overshoot
   - c. have no effect

18. Increasing a PID derivative gain K_D will?
   - a. decrease overshoot
   - b. increase overshoot
   - c. have no effect

19. The PID controller works best with?
   - a. plants with very long delays
   - b. complex plants with high order dynamics
   - c. simple plants with step response similar to that of a first order system

20. There are two standard PID forms, one parameterized in terms of absolute gain and the other a proportional gain and time related to integration and differentiation. Parameter equivalence between structures is related as?
   - b. \{K_P, K_I, K_D\} <-> \{K_P, K_P*T_I, K_P/T_D\}
   - c. \{K_P, K_I, K_D\} <-> \{K_P, T_I, T_D\}

21. The PI*PD configuration uses a?
   - a. PI controller in cascade with PD controller operating in forward path on the error
   - b. PI controller in forward path operating on error between output PD controller in feedback path and command input
   - c. forward path sum of PI and PD controllers in tandem

22. The PIPD configuration uses?
   - a. PI controller in cascade with PD controller operating in forward path on the error
   - b. PI controller in forward path operating on error between PD controller in output feedback path and command input
23. The most well-known PID tuning methods are?
   - a. Fourier transform
   - b. Laplace transform
   - c. Ziegler and Nichols tuning methods

24. An issue with the PID derivative term is?
   - a. windup
   - b. noise amplification
   - c. there are not any issues

25. An issue with the PID integral term is?
   - a. windup
   - b. noise amplification
   - c. there are not any issues