

國立中山大學 107 學年度碩士暨碩士專班招生考試試題

科目名稱：自動控制【機電系碩士班丙組】

題號：438005

※本科目依簡章規定「可以」使用計算機（廠牌、功能不拘）（問答申論題） 共 1 頁第 1 頁

以下均為簡答題，只要簡明的回答我們所提出的問題重點即可，真的不需要長篇大論

1. (8%) Briefly describe the relationship between phase margin and time delay.
2. (8%) Briefly describe the relationship between impulse response and transfer function model of a linear system.
3. (8%) How do you compare the speed-of-response of two linear systems from their impulse responses?
4. (8%) How do you experimentally determine the frequency response of a linear system?
5. (8%) This problem considers systems
$$m\ddot{x} + c\dot{x} + kx = f(t) \text{ and } m\ddot{x} + c\dot{x} + kx = f'(t) + f(t)$$
Which system has larger overshoot? Why.
6. (8%) If I told you that, compared to open-loop system, one of advantages of the closed-loop systems is that the closed-loop system can more effectively tolerate measurement noise than the open-loop system. Would you agree? Why or why not?
7. (8%) After increasing the bandwidth of his closed-loop system design, John discovers that he has successfully reduced the time constant of the system. Encouraged by this success, John believes that he can make the time constant of the closed-loop system even smaller by further increasing the bandwidth of the closed-loop system. If this logic is correct, John can increase the speed of the system without limitation. Apparently, this is physically impossible. Why?
8. (8%) A linear time-invariant system is a linear system whose parameters do not change with time. What is the most important property of such a system?
9. (8%) Why does PI (proportional-integral) controller more popular than PID (proportional-integral-derivative) controller in industry control applications?
10. (8%) You are told not to perform pole-zero cancellation for an unstable system. What is the reason behind this advice?
11. (10%) How do you determine a system is a linear or a nonlinear system?
12. (10%) Given the Bode plots of the two separate linear stable systems whose transfer functions are G_1 and G_2 , respectively, how do you determine the Bode plot for the two systems in series connection?