

2010年硕士研究生入学考试试题参考答案

(自动控制理论)

一、1. B

系统闭环传递函数为

$$\frac{Y(s)}{R(s)} = \frac{G(s)}{1+G(s)} = \frac{4(s+5)}{s^2+14s+25}$$

$$\therefore y(t) = \lim_{s \rightarrow 0} s Y(s) = \lim_{s \rightarrow 0} \frac{4(s+5)}{s^2+14s+25} = 0.8$$

由Bode图，列写系统的开环传递函数为

$$\begin{aligned} G(s) &= \frac{K(T_2s+1)}{s(T_1s+1)(T_3s+1)} = \frac{K \cdot 0.2s+1}{s(0.1s+1)(\frac{1}{4}s+1)} \\ &= \frac{K(5s+1)}{s(10s+1)(0.25s+1)} \end{aligned}$$

由图，知 $20 \lg |G(j\omega)|_{\omega=1} = 0$

$$\therefore \frac{K \cdot 5}{1 \cdot 10} = 1 \rightarrow K = 2$$

$$\therefore G(s) = \frac{2(5s+1)}{s(10s+1)(0.25s+1)}$$