

2006 年攻读硕士学位研究生入学试题

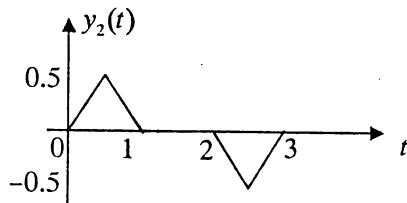
考试科目： 信号系统与数字电路

一、信号系统

1. (8 分) 解:

$$x_2(t) = \int_{-\infty}^t x_1(\tau) d\tau - \int_{-\infty}^{t-2} x_1(\tau) d\tau$$

$$y_2(t) = \int_{-\infty}^t y_1(\tau) d\tau - \int_{-\infty}^{t-2} y_1(\tau) d\tau$$



2. (8 分) 解:

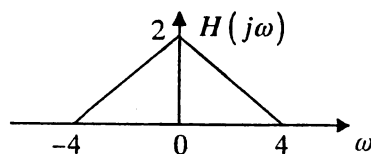
$$h[n] = h_1[n] * h_2[n] = \{2, 5, 2\}, n = 0, 1, 2$$

$$x[n] = \delta[n] + \delta[n-2]$$

3. (14 分) 解:

$$h(t) = \pi \left(\frac{\sin 2t}{\pi t} \right)^2$$

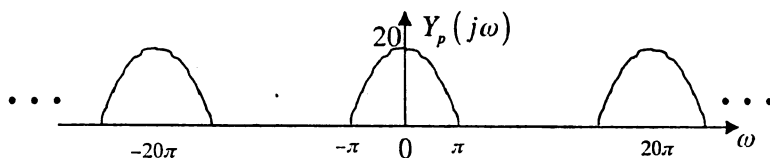
$$y(t) = 2 + (2 - \pi/2) \cos \pi t$$



4. (15 分) 解:

(1) $Y(j\omega) = 0$ for $|\omega| > \pi$, 采样速率 $\omega_s > 2\pi$, $T < 1$ 秒;

(2) 若 $T = 0.1$ 秒, $Y_p(j\omega) = 10 \sum_{n=-\infty}^{+\infty} Y[j(\omega - 20n\pi)]$

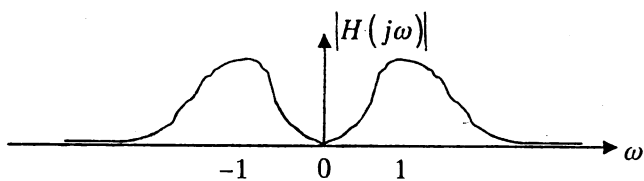


5. (15 分) 解:

(1) $H(s) = \frac{s}{(s+1)^2}$, $\text{Re}\{s\} > -1$

(2) $h(t) = (e^{-t} - te^{-t})u(t)$

(3) 该系统为带通滤波器。



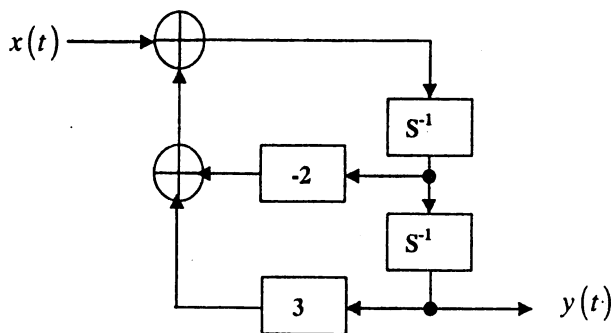
6. (15分) 解:

(1) $H(s) = \frac{1}{(s+3)(s-1)}$, $\text{Re}\{s\} > 1$

(2) 该系统不稳定

(3) 若系统的输入信号 $x(t) = e^{2t}$, $-\infty < t < +\infty$, $y(t) = H(s)|_{s=2} e^{2t} = \frac{1}{5} e^{2t}$

(4) 该系统的模拟框图



7. (15分) 解:

(1) $H(z) = \frac{z^{-1}}{\left(1 - \frac{1}{2}z^{-1}\right)\left(1 - 2z^{-1}\right)}$, $\frac{1}{2} < |z| < 2$

(2) $h[n] = -\frac{2}{3}\left(\frac{1}{2}\right)^n u[n] - \frac{2}{3}2^n u[-n-1]$, 该系统是非因果的。

(3) $y[n] = H(-1)(-1)^n = -\frac{2}{9} \cos \pi n$

二、模拟电路