

# 2006级电子类信号与系统(A类)终考试B卷答案

## 一. 基本题

1.  $h[n] = \begin{cases} 1, & n \geq 0 \\ 2, & n = 1 \\ 3, & n = 2 \\ 0, & n < 0 \end{cases}$

2.  $x'(t) = 2\cos(2t)u(t)$        $x^{(1)}(t) = (\frac{1}{2} - \frac{1}{2}\cos 2t)u(t)$

3.  $f(t) = Sa(100t) = \frac{\sin 100t}{100t} = \frac{\pi \sin 100t}{100\pi t}$        $F(\omega) = \frac{\pi}{100} G_{200}(\omega)$       (4分)

最高角频率为  $100/\pi$        $\omega_s = 2 \times 100 = 200/\pi$        $T_s = \frac{2\pi}{\omega_s} = \frac{2\pi}{200} = \frac{\pi}{100}$  秒      (4分)

4.  $Z(\Omega) = \cos^2 \Omega = \frac{1 + \cos 2\Omega}{2} = \frac{1}{2} + \frac{1}{4} [e^{j2\Omega} + e^{-j2\Omega}]$

$\therefore x[n] = \frac{1}{2} \delta(n) + \frac{1}{4} \delta(n+2) + \frac{1}{4} \delta(n-2)$       (8分)

5.

$$X(s) = s - 4 + \frac{18s - 4}{s^2 + 4s}$$

$$x(t) = \delta'(t) - 4\delta(t) + L^{-1} \left[ \frac{18s - 4}{s^2 + 4s} \right]$$

$$x(t) = \delta'(t) - 4\delta(t) + [-1 + 19e^{-4t}]u(t)$$

6、

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -29 & -4 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} e^{st}$$
$$y = \begin{bmatrix} 9 & 2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

## 二. 计算题

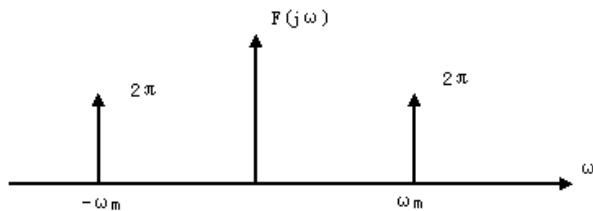
1. (1)  $h(t) = e^{-t}u(t)$  (5分)

(2)  $y'(t) + y(t) = x(t)$  (5分)

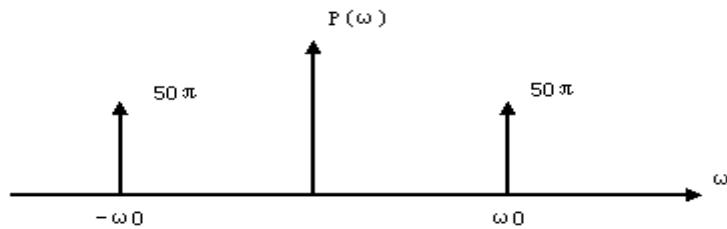
(3)  $y_0(t) = -4e^{-t}u(t)$  (4分)

$$y(t) = (t - 1 - 3e^{-t})u(t) \quad (3 \text{ 分})$$

2、 (1)  $F(j\omega) = 2\pi[\delta(\omega + \omega_m) + \delta(\omega - \omega_m)] \quad (4 \text{ 分})$

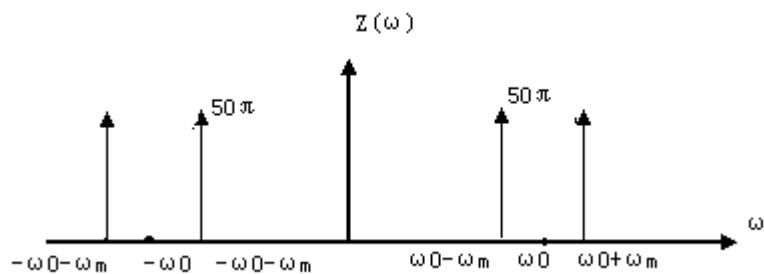


(2)  $P(\omega) = 50\pi[\delta(\omega + \omega_0) + \delta(\omega - \omega_0)] \quad (4 \text{ 分})$



(3) (5 分)

$$\begin{aligned} x(t) &= f(t) \cdot p(t) \leftrightarrow \frac{1}{2\pi}[F(\omega) * P(\omega)] \\ &= 50\pi[\delta(\omega - \omega_0 - \omega_m) + \delta(\omega - \omega_0 + \omega_m) + \delta(\omega + \omega_0 - \omega_m) + \delta(\omega + \omega_0 + \omega_m)] \end{aligned}$$



(4)

$$Y(j\omega) = 50\pi[\delta(\omega + \omega_0 - \omega_m) + \delta(\omega - \omega_0 - \omega_m)] = 50\cos(\omega_0 - \omega_m)t \quad (5 \text{ 分})$$

$$Y(z) = -\frac{z}{3(z+1)} + \frac{z}{(z+2)} + \frac{z}{3(z-2)} \quad |z| > 2$$

$$X(z) = \frac{z}{z-2} \quad |z| > 2$$

$$(1) H(z) = \frac{Y(z)}{X(z)} = \frac{z^2}{(z+1)(z+2)} \quad |z| > 2$$

$$(2) H(z) = \frac{-z}{(z+1)} + \frac{2z}{(z+2)} \quad h(n) = [(-1)^{n+1} + 2(-2)^n]u(n)$$

$$(3) y(n) + 3y(n-1) + 2y(n-2) = x(n) \leftrightarrow \text{模拟框图}$$

$$(4) y(n) = \frac{9}{2}(-3)^n$$