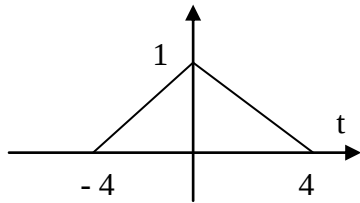
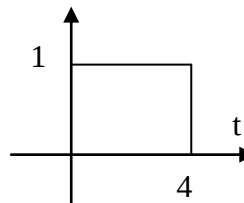


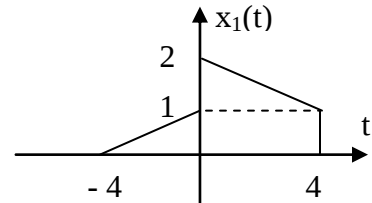
Câu 1: (2 điểm)



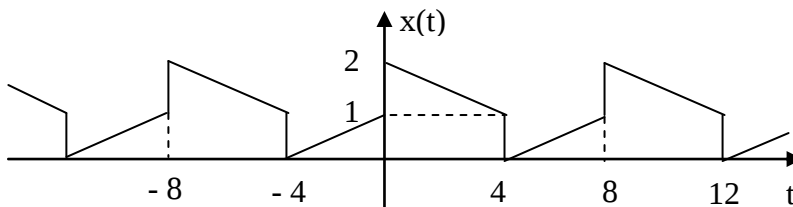
(0,5)



(0,5)



(0,5)



(0,25)

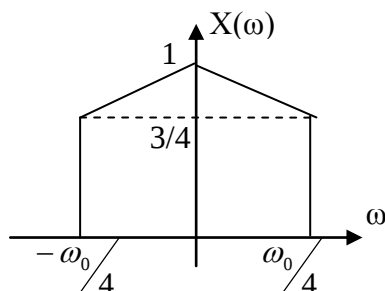
$$P_x = \frac{1}{8} \left[\int_{-4}^0 \left(\frac{t}{4} + 1 \right)^2 dt + \int_0^4 \left(\frac{-t}{4} + 2 \right)^2 dt \right] = \frac{4}{3} \text{ đvcs}$$

(0,25)

Câu 2: (1 điểm)

$$X_1(\omega) = \frac{2\pi}{\omega_0} \wedge \left(\frac{\omega}{\omega_0} \right) \quad (0,25)$$

$$X_2(\omega) = \frac{4\pi}{\omega_0} \Pi \left(\frac{\omega}{\omega_0/2} \right) \quad (0,25)$$



(0,25)

$$E_x = \frac{1}{\pi} \int_{-\omega_0/4}^0 \left(\frac{\omega}{\omega_0} + 1 \right)^2 d\omega = \frac{37\omega_0}{3.4^3} \text{ đvnl}$$

(0,25)

Câu 3: (2 điểm)

$$X(s) = \frac{s}{s^2 + 4} \quad (0,5)$$

$$H(s) = \frac{1}{s+1} \quad (0,5)$$

$$Y(s) = X(s).H(s) = \frac{s}{(s^2 + 4)(s+1)} \quad (0,25)$$

$$Y(s) = \frac{-1/5}{s+1} + \frac{s/5}{s^2+4} + \frac{4/5}{s^2+4} \quad (0,5)$$

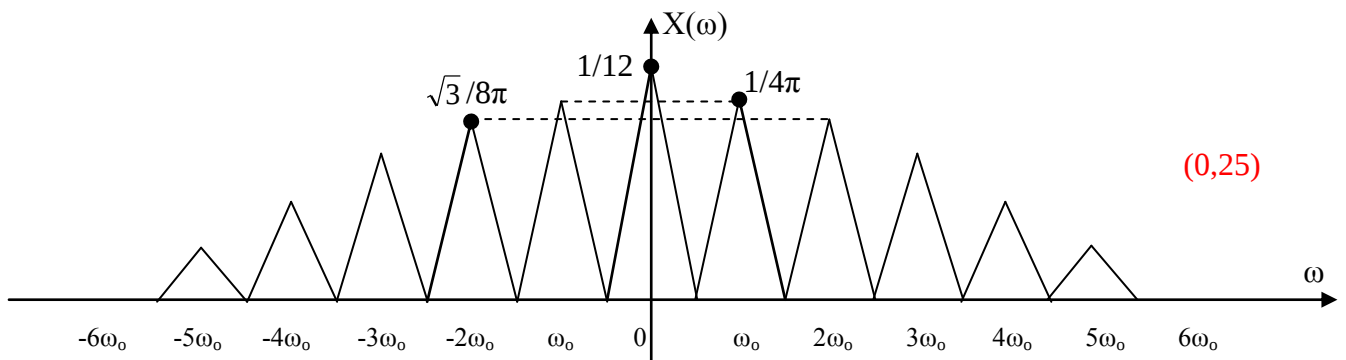
$$y(t) = \frac{-1}{5}e^{-t}u(t) + \frac{1}{5}\cos(2t)u(t) + \frac{2}{5}\sin(2t)u(t) \quad (0,25)$$

Câu 4: (5 điểm)

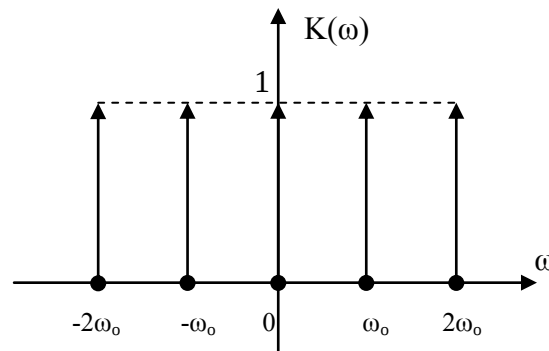
$$M(\omega) = \frac{1}{2} \wedge \left(\frac{\omega}{2\omega_1} \right) \quad (0,5)$$

$$S(\omega) = \dots = 2\pi \sum_{n=-\infty}^{+\infty} \frac{1}{6} \text{Sa}\left(\frac{n\pi}{6}\right) \delta(\omega - n\omega_0) \quad (0,75)$$

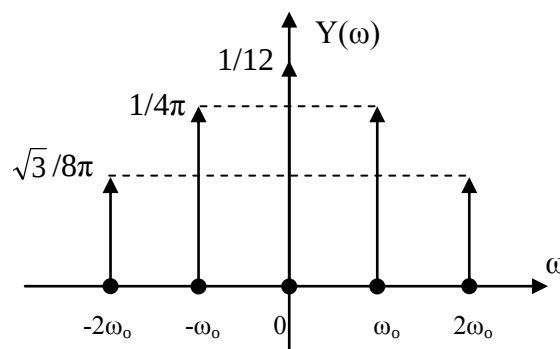
$$X(\omega) = \frac{1}{2\pi} M(\omega) * S(\omega) = \frac{1}{12} \sum_{n=-\infty}^{+\infty} \text{Sa}\left(\frac{n\pi}{6}\right) \wedge \left(\frac{\omega - n\omega_0}{2\omega_1} \right) \quad (0,5)$$



$$K(\omega) = \delta(\omega) + \delta(\omega - \omega_0) + \delta(\omega + \omega_0) + \delta(\omega - 2\omega_0) + \delta(\omega + 2\omega_0) \quad (0,5)$$

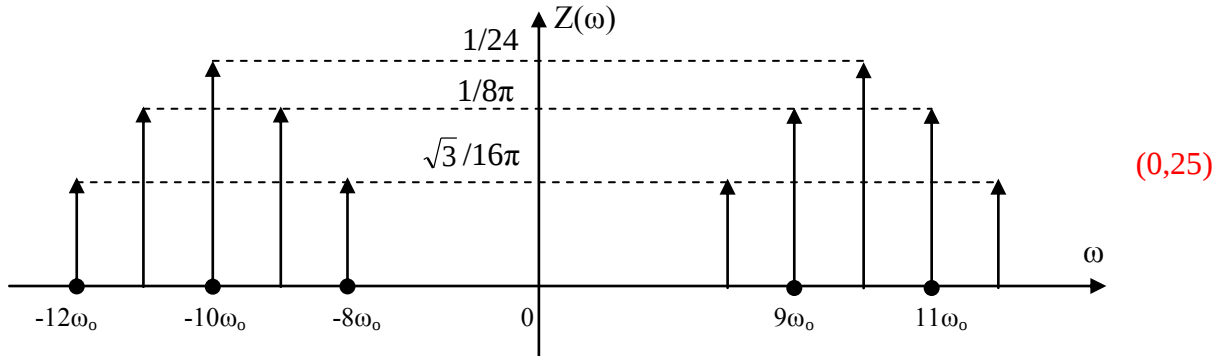


$$Y(\omega) = X(\omega).K(\omega) = \frac{1}{12} \delta(\omega) + \frac{1}{4\pi} [\delta(\omega - \omega_0) + \delta(\omega + \omega_0)] + \frac{\sqrt{3}}{8\pi} [\delta(\omega - 2\omega_0) + \delta(\omega + 2\omega_0)] \quad (0,25)$$

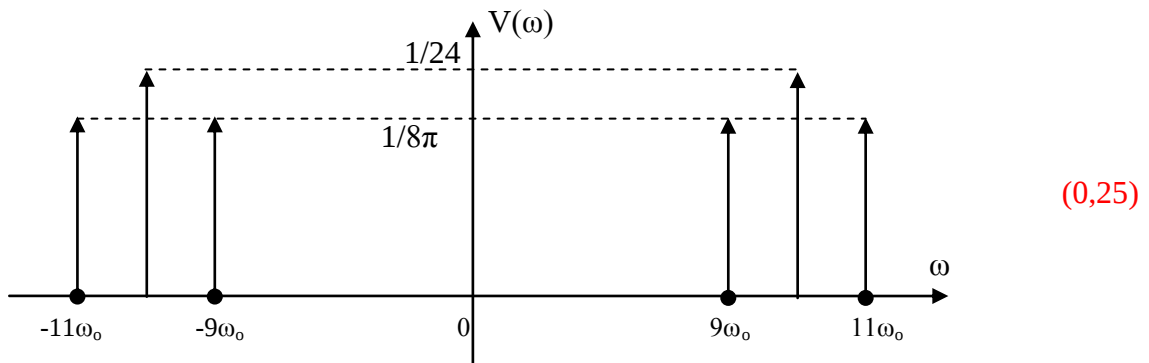
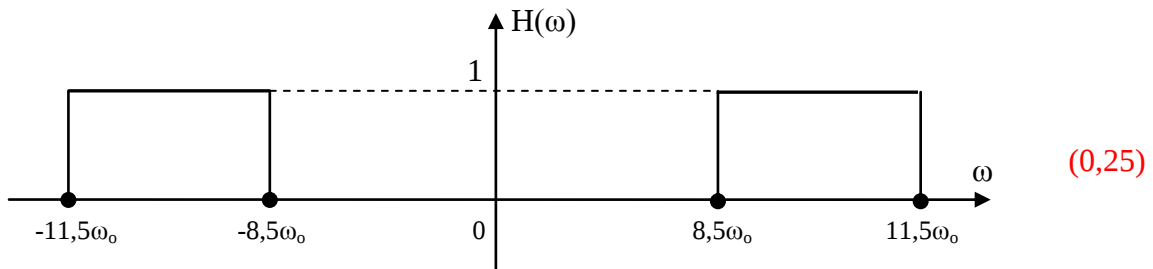


$$Z(\omega) = \frac{1}{2} [Y(\omega - 10\omega_0) + Y(\omega + 10\omega_0)] \quad (0,25)$$

$$\begin{aligned} Z(\omega) &= \frac{\sqrt{3}}{16\pi} [\delta(\omega - 8\omega_0) + \delta(\omega + 8\omega_0)] + \frac{1}{8\pi} [\delta(\omega - 9\omega_0) + \delta(\omega + 9\omega_0)] \\ &+ \frac{1}{24} [\delta(\omega - 10\omega_0) + \delta(\omega + 10\omega_0)] \\ &+ \frac{1}{8\pi} [\delta(\omega - 11\omega_0) + \delta(\omega + 11\omega_0)] + \frac{\sqrt{3}}{16\pi} [\delta(\omega - 12\omega_0) + \delta(\omega + 12\omega_0)] \end{aligned} \quad (0,25)$$



$$\begin{aligned} V(\omega) = H(\omega).Z(\omega) &= \frac{1}{24} [\delta(\omega - 10\omega_0) + \delta(\omega + 10\omega_0)] + \frac{1}{8\pi} [\delta(\omega - 9\omega_0) + \delta(\omega + 9\omega_0)] \\ &+ \frac{1}{8\pi} [\delta(\omega - 11\omega_0) + \delta(\omega + 11\omega_0)] \end{aligned} \quad (0,25)$$



$$v(t) = \frac{1}{24\pi} \cos(10\omega_0 t) + \frac{1}{8\pi^2} [\cos(9\omega_0 t) + \cos(11\omega_0 t)] \quad (0,25)$$

Cán bộ coi thi không giải thích đề thi.

Tp. HCM, ngày 01 tháng 01 năm 2015

Trưởng bộ môn