

ES.2

$$x(t) = \sum_{n=-\infty}^{\infty} S_n e^{j2\pi n t / T_0} \quad T_0 = 2s$$

$$\begin{aligned} x(t) &= 1.5 e^{-j\frac{\pi}{2}} e^{-j6\pi t / T_0} + 3 e^{-j\frac{\pi}{2}} e^{-j2\pi t / T_0} + 5 e^{j\pi} + 3 e^{j\frac{\pi}{2}} e^{j2\pi t / T_0} + 1.5 e^{j6\pi t / T_0} \\ &= -5 + 6 \cos\left(\frac{2\pi t}{T_0} + \frac{\pi}{2}\right) + 3 \cos\left(\frac{6\pi t}{T_0} + \frac{\pi}{3}\right) \\ &= -5 - 6 \sin(\pi t) + 3 \cos\left(3\pi t + \frac{\pi}{3}\right) \end{aligned}$$

ES.3

I) A ~~B~~

II) 225 Hz

III) 9-11 MHz A ~~B~~

IV)
$$\bar{S}(f) = \frac{1}{T} \sum_{k=-\infty}^{\infty} S\left(f - \frac{k}{T}\right)$$

ES.6

I) C ~~B~~

II) A ~~B~~

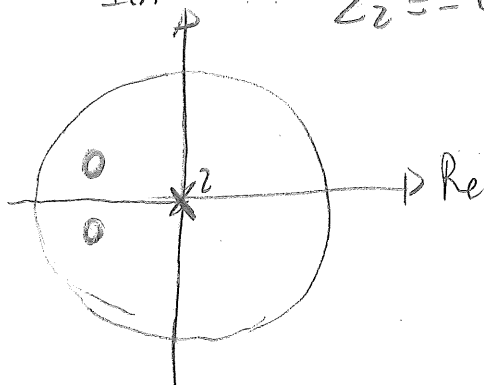
III) 0.1592s $-2\pi f t_0 = \Delta\phi \Rightarrow -2 \text{ rad} = -2\pi \cdot 2 \cdot t_0 \Rightarrow t_0 = 0.1592$

IV) $Y[n] = X[n] + 1.3 X[n-1] + 0.5 X[n-2]$

$$Y(z) = X(z) [1 + 1.3z^{-1} + 0.5z^{-2}] \quad H(z) = \frac{z^2 + 1.3z + 0.5}{z^2}$$

$$\Delta = -0.31 \quad z_1 = \frac{-b + \sqrt{\Delta}}{2a} = -0.65 + 0.2784i$$

$$z_2 = -0.65 - 0.2784i$$



\rightarrow possa baso

Es. 7

I) C D

II) C D

III) A D

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