

Kode Soal: B

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[4.1.1] What is the Fourier Transform representation of an aperiodic signal conceptually derived from?

- A. Summation of exponential functions over finite intervals.
- B. The limit of Fourier series representation of a periodic signal as its period becomes arbitrarily large.
- C. Direct application of integration to any signal.
- D. Convolution of the signal with a complex exponential.

[4.4.1] What is the fundamental relationship between time-domain convolution and frequency-domain multiplication for two signals  $x(t)$  and  $h(t)$ ?

- A.  $\mathcal{F}\{x(t) * h(t)\} = X(j\omega) + H(j\omega)$
- B.  $\mathcal{F}\{x(t) * h(t)\} = X(j\omega)H(j\omega)$
- C.  $\mathcal{F}\{x(t) * h(t)\} = X(j\omega)/H(j\omega)$
- D.  $\mathcal{F}\{x(t) * h(t)\} = X(j\omega) - H(j\omega)$

[4.4.4] For an LTI system to be stable, its impulse response  $h(t)$  must satisfy which condition for the Fourier Transform  $H(j\omega)$  to be guaranteed to exist?

- A.  $h(t)$  must be causal.
- B.  $h(t)$  must be absolutely integrable.
- C.  $h(t)$  must be periodic.
- D.  $h(t)$  must be an even function.

[4.4.7] Why is an ideal lowpass filter generally not realizable in practice, especially for causal systems?

- A. Its frequency response is too complex to build.
- B. Its impulse response is not causal.
- C. It has an infinite gain at low frequencies.
- D. It requires infinite power.

[4.5.3] When a signal  $s(t)$  is multiplied by  $p(t) = \cos(\omega_0 t)$  in the time domain, what effect does this typically have on the spectrum  $S(j\omega)$  in the frequency domain?

- A. The spectrum  $S(j\omega)$  is compressed.
- B. The spectrum  $S(j\omega)$  is shifted to  $\pm\omega_0$  and scaled.
- C. The spectrum  $S(j\omega)$  is inverted.
- D. The spectrum  $S(j\omega)$  becomes continuous.

[4.1.4] In the context of aperiodic signals, what is  $X(j\omega)$  commonly referred to as?

- A. The time-domain response
- B. The frequency response
- C. The spectrum of  $x(t)$
- D. The complex amplitude

[4.1.7] What is the Fourier Transform of the unit impulse function  $x(t) = \delta(t)$ ?

- A.  $\frac{1}{j\omega}$
- B. 0
- C. 1
- D.  $\delta(\omega)$

[4.1.10] What is the inverse relationship that exists between the time and frequency domains regarding signal width?

- A. A broader signal in the time domain always results in a broader signal in the frequency domain.
- B. A narrower signal in the time domain always results in a narrower signal in the frequency domain.
- C. Broadening in one domain leads to narrowing in the other domain.
- D. Signal width in one domain has no direct impact on the other.

[4.3.3] When a signal  $x(t)$  is time-shifted to  $x(t - t_0)$ , what happens to the magnitude of its Fourier transform,  $|X(j\omega)|$ ?

- A. The magnitude is multiplied by  $|t_0|$ .
- B. The magnitude is shifted by  $t_0$ .
- C. The magnitude remains unchanged.
- D. The magnitude is divided by  $t_0$ .

[4.3.6] If  $x(t) \xleftrightarrow{\mathcal{F}} X(j\omega)$ , what is the Fourier Transform of  $x(at)$  for a nonzero real number  $a$ ?

- A.  $aX(ja\omega)$
- B.  $\frac{1}{a}X(j\frac{\omega}{a})$
- C.  $\frac{1}{|a|}X(j\frac{\omega}{a})$
- D.  $|a|X(ja\omega)$