

Kode Soal: B

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[9.8.9] Given a feedback system where $H_1(s) = 1/(s+1)$ in the forward path and $H_2(s) = 2$ in the feedback path, and the feedback signal is subtracted from the input. What is the overall system function $H(s) = Y(s)/X(s)$?

- A. $\frac{1}{s+3}$
- B. $\frac{1}{s-1}$
- C. $\frac{2}{s+1}$
- D. $\frac{s+1}{s+3}$

[9.2.4] If $x(t)$ is a left-sided signal, and its Laplace transform converges, what is the nature of its Region of Convergence (ROC)?

- A. A right-half plane, $\text{Re}\{s\} > \sigma_0$
- B. A left-half plane, $\text{Re}\{s\} < \sigma_0$
- C. A strip parallel to the $j\omega$ -axis
- D. The entire s -plane

[9.3.1] What is the basic equation for the inverse Laplace transform $x(t)$?

- A. $x(t) = \frac{1}{2\pi j} \int_{-\infty}^{+\infty} X(s)e^{st} ds$
- B. $x(t) = \frac{1}{2\pi j} \int_{\sigma-j\infty}^{\sigma+j\infty} X(s)e^{st} ds$
- C. $x(t) = \int_{-\infty}^{+\infty} X(s)e^{st} ds$
- D. $x(t) = \frac{1}{2\pi} \int_{-\infty}^{+\infty} X(s)e^{j\omega t} d\omega$

[9.8.3] For a feedback interconnection where the output of $H_2(s)$ is subtracted from the input $X(s)$ before entering $H_1(s)$, what is the overall system function $H(s) = Y(s)/X(s)$?

- A. $H(s) = H_1(s) + H_2(s)$
- B. $H(s) = H_1(s)H_2(s)$
- C. $H(s) = \frac{H_1(s)}{1-H_1(s)H_2(s)}$
- D. $H(s) = \frac{H_1(s)}{1+H_1(s)H_2(s)}$

[9.1.13] In a rational Laplace transform $X(s) = N(s)/D(s)$, what are the roots of the denominator polynomial $D(s)$ called?

- A. Poles of $X(s)$
- B. Zeros of $X(s)$
- C. Critical points
- D. Eigenvalues

[9.1.4] If the complex variable s is purely imaginary ($s = j\omega$), what does the Laplace transform $X(s)$ become?

- A. The inverse Fourier transform of $x(t)$
- B. The Fourier transform of $x(t)$
- C. The convolution of $x(t)$
- D. The Z-transform of $x(t)$

[9.3.7] Given $X(s) = \frac{1}{(s+1)(s+2)}$ with ROC $\text{Re}\{s\} > -1$, what is the partial-fraction coefficient A for the term $\frac{A}{s+1}$?

- A. -1
- B. 1
- C. 2
- D. -2

[9.1.1] What is the general term for the integral $H(s) = \int_{-\infty}^{\infty} h(t)e^{-st} dt$?

- A. Fourier Transform
- B. Convolution Integral
- C. Laplace Transform
- D. Z-Transform

[9.1.16] How are zeros typically marked on an s -plane plot?

- A. With a circle (o)
- B. With a star (*)
- C. With an x (x)
- D. With a square ()

[9.1.7] For the signal $x(t) = e^{-at}u(t)$, under what condition does its Laplace transform converge?

- A. $\text{Re}\{s\} < a$
- B. $\text{Re}\{s\} > -a$
- C. $\text{Re}\{s\} = 0$
- D. $\text{Re}\{s\} < -a$

[9.5.2] If $x(t) \leftrightarrow X(s)$ with ROC R , what is the Laplace transform of $x(t - t_0)$?

- A. $e^{st_0}X(s)$
- B. $e^{-st_0}X(s)$
- C. $X(s - t_0)$
- D. $X(s + t_0)$

[9.1.10] On the s -plane, which axis represents the real part of s ?

- A. The $j\omega$ -axis
- B. The t -axis
- C. The σ -axis
- D. The z -axis

[9.2.7] For a rational Laplace transform $X(s)$ corresponding to a left-sided signal $x(t)$, the ROC is the region in the s -plane:

- A. To the left of the leftmost pole.
- B. To the right of the rightmost pole.
- C. Between the leftmost and rightmost poles.
- D. The entire s -plane.

[9.1.19] For the Laplace transform in Example 9.5, $X(s) = \frac{(s-1)^2}{(s+1)(s-2)}$, does the Fourier transform of the corresponding $x(t)$ converge?

- A. Yes, because the ROC includes the $j\omega$ -axis.
- B. No, because the ROC does not include the $j\omega$ -axis.
- C. It depends on the value of s .
- D. Only for specific values of t .

[9.7.2] What is the common term used for $H(s)$ in the context of Laplace transforms for LTI systems?

- A. Frequency response
- B. Transfer function
- C. Impulse response
- D. Step response

[9.3.4] If the Region of Convergence (ROC) for a rational Laplace transform $X(s)$ is to the right of the rightmost pole, what type of signal is $x(t)$?

- A. Left-sided
- B. Two-sided
- C. Right-sided
- D. Finite duration

[9.3.10] If the ROC of $X(s)$ is $\text{Re}\{s\} > -1$, does the Laplace transform of $x(t)$ exist?

- A. Yes
- B. No
- C. Only if $X(s)$ is non-rational
- D. Only if $x(t)$ is a finite duration signal

[9.2.3] Can the Region of Convergence (ROC) for a rational Laplace transform contain any poles?

- A. Yes, always
- B. No, because $X(s)$ is infinite at poles
- C. Only if the signal is finite duration
- D. Only if the signal is right-sided

[9.7.5] An LTI system is stable if and only if the ROC of its system function $H(s)$ includes which part of the s -plane?

- A. The entire real axis.
- B. The entire imaginary axis ($j\omega$ -axis).

C. The left-half plane.

D. The right-half plane.

[9.5.5] If $x_1(t) \leftrightarrow X_1(s)$ and $x_2(t) \leftrightarrow X_2(s)$, what is the Laplace transform of their convolution $x_1(t) * x_2(t)$?

- A. $X_1(s) + X_2(s)$
- B. $X_1(s)/X_2(s)$
- C. $X_1(s)X_2(s)$
- D. $sX_1(s)X_2(s)$

[9.7.8] If an LTI system is characterized by a linear constant-coefficient differential equation, what can be generally said about its system function $H(s)$?

- A. It is always an exponential function.
- B. It is always a rational function of s .
- C. It is always a polynomial in s .
- D. It is always a constant.

[9.7.11] An LTI system is known to be causal and has poles at $s = -3$ and $s = 2$. Is this system stable?

- A. Yes, because it is causal.
- B. No, because it has a pole in the right-half plane.
- C. Yes, because its poles are real.
- D. Insufficient information to determine stability.

[9.8.6] If a system function $H(s)$ is expressed as a sum of simpler system functions using partial-fraction expansion, which block diagram representation is suggested?

- A. Direct form
- B. Parallel form
- C. Cascade form
- D. Series form