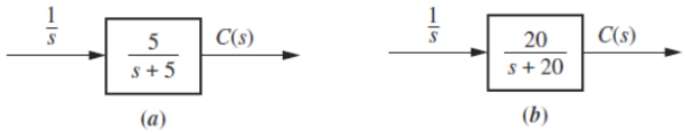
Question: Find the output response, c(t), for each of the system shown bel...

Find the output response, c(t), for each of the system shown below. Find the time constant, rise time, and settling time for each case.



Show transcribed image text

Expert Answer

Anonymous answered this
426 answers

Was this answer helpful? 1 0

(a) for fig(a)

$$\frac{C(s)}{R(s)} = \frac{5}{s+5}$$

$$C(s) = \frac{5R(s)}{s+5}$$

$$C(s) = \frac{5}{s(s+5)}$$

$$C(s) = \frac{1}{s} - \frac{1}{s+5}$$

$$C(t) = (1 - e^{-5t}) \quad \text{—①}$$

from Equation ①

standard form is, $C(t) = (1 - e^{-t/\tau}) \rightarrow ②$

compare ① & ②

Time constant, $\tau = \frac{1}{5} = 0.2\,\text{sec}$.

Rise time $= 2.2\tau$

$= 2.2(0.2)$

$\boxed{t_r = 0.44\,\text{sec}}$

setting time $t_s = 4\tau$

$= 4 \times 0.2$

$\boxed{t_s = 0.8\,\text{sec}}$

(b) From fig (b)

$$\frac{C(s)}{R(s)} = \frac{20}{s+20}$$

$$\Rightarrow C(s) = \frac{20\,R(s)}{s+20}$$

$$C(s) = \frac{20}{s(s+20)}$$

$$C(s) = \frac{1}{s} - \frac{1}{s+20}$$

$$\boxed{c(t) = 1 - e^{-20t}} \quad -(1)$$

standard form is,

$$c(t) = 1 - e^{-t/\tau} \quad -(2)$$

compare (1) & (2)

Time constant $\tau = \frac{1}{20} = 0.05$ sec

Rise time $= 2.2\tau$

$= 2.2 \times 0.05$

$$\boxed{t_r = 0.11 \text{ sec}}$$

Setting time $t_s = 4\tau$

$= 4 \times 0.05$

$$\boxed{t_s = 0.2 \text{ sec}}$$

—o—

— pleas like —

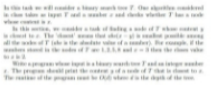
Comment >

Up next for you in Computer Science

Interview either (i) a person you know over 65 or (ii) achild you know under 16 about their experience, attitude andexpectations of computers. What factors would you take into accountif you were designing a

See answer

you answer this question before but I have a question :Initialization minimum difference should be inside ...



See answer

See more questions for subjects you study

Questions viewed by other students

Q: 7. For each of the transfer function shown below, find the locations of the poles and zeros. Plot them on the s-plane. a. 32+55+6 4s +1 es(s2 +8s +45) (S+1) c. s(s+2)(8+5) and report the kind 8. For each of the transfer function below, find the value of Sand of response expected. a. 52+85+12 225 b. 32+30+225

A: See answer 100% (1 rating)

Q: Find the output response, c(t), for each of the systems shown in Fig. 1. Also find the time constant, rise time, and settling time for each case. s+5 (a)

A: See answer

Show more