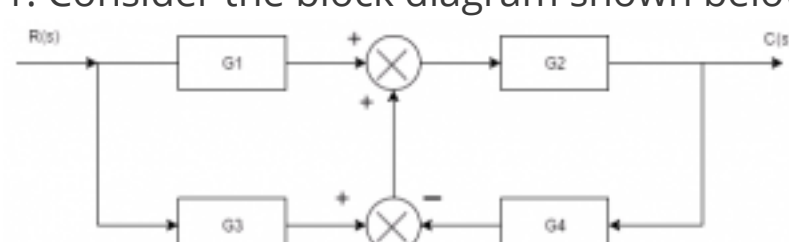


Control Systems Questions and Answers – Block diagram Algebra

This set of Control Systems Multiple Choice Questions & Answers (MCQs) focuses on “Block diagram Algebra”.

1. Consider the block diagram shown below:



If the transfer function of the system is given by $T(s) = \frac{G_1 G_2 + G_2 G_3}{1 + X}$. Then X is:

- a) $G_2 G_3 G_4$
- b) $G_2 G_4$
- c) $G_1 G_2 G_4$
- d) $G_3 G_4$

View Answer

Answer: b

Explanation: Use the technique of making two different block diagram by dividing two summers and use the approaches of shifting take off point and blocks.

2. For the block diagram given in the following figure, the expression of C/R is:



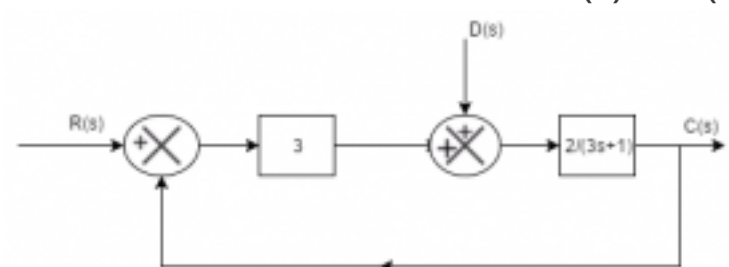
- a) $\frac{G_1 G_2 G_3}{1 - G_2 G_1}$
- b) $\frac{G_1 G_2}{1 - G_1 G_2 G_3}$
- c) $\frac{G_1 G_2 G_3}{1 - G_1 G_2 G_3}$
- d) $\frac{G_1 G_2}{G_3(1 - G_1 G_2)}$

View Answer

Answer: a

Explanation: Block diagram is being converted into signal flow graphs by considering each take off point as a node and each forward transfer function as forward gain.

3. The transfer function from D(s) to Y(s) is :



- a) $\frac{2}{3s+7}$
- b) $\frac{2}{3s+1}$
- c) $\frac{6}{3s+7}$
- d) $\frac{2}{3s+6}$

View Answer

Answer: a

Explanation: $Y(s)/D(s) = \frac{2}{3s+1} \cdot \frac{1}{1+3 \cdot \frac{2}{3s+1}} = \frac{2}{3s+7}$.

4. The closed loop gain of the system shown in the given figure is :



- a) $-\frac{9}{5}$
- b) $-\frac{6}{5}$
- c) $\frac{6}{5}$
- d) $\frac{9}{5}$

View Answer

Answer: b

Explanation: $C(s)/R(s) = \frac{-3}{1+3 \cdot \frac{0.5}{-3}} = -\frac{6}{5}$.

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5. The advantage of block diagram representation is that it is possible to evaluate the contribution of each component to the overall performance of the system.

- a) True
- b) False

View Answer

Answer: a

Explanation: The advantage of the block diagram is that it is possible to get the contribution of each block to the overall performance of the system.

6. The overall transfer function from block diagram reduction for cascaded blocks is :

- a) Sum of individual gain
- b) Product of individual gain
- c) Difference of individual gain
- d) Division of individual gain

View Answer

Answer: b

Explanation: Gain of block get multiplied when they are cascaded where cascaded means that the blocks are in series combination with no summer in between.

7. The overall transfer function of two blocks in parallel are :

- a) Sum of individual gain
- b) Product of individual gain
- c) Difference of individual gain
- d) Division of individual gain

View Answer

Answer: a

Explanation: The gains get added as the blocks are connected in parallel with the summer in between and they are connected with the same sign.

8. Transfer function of the system is defined as the ratio of Laplace output to Laplace input considering initial conditions_____

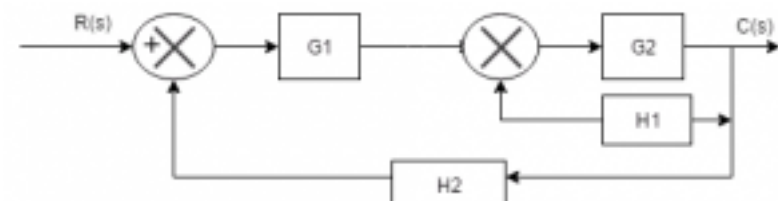
- a) 1
- b) 2
- c) 0
- d) infinite

View Answer

Answer: c

Explanation: By definition transfer function is the ratio of the laplace output to the input but the initial conditions mainly the stored energy is zero.

9. In the following block diagram, $G_1 = 10/s$, $G_2 = 10/s+1$, $H_1 = s+3$, $H_2 = 1$. The overall transfer function is given by :



- a) $\frac{10}{11s^2+31s+10}$
- b) $\frac{100}{11s^2+31s+100}$
- c) $\frac{100}{11s^2+31s+10}$
- d) $\frac{100}{11s^2+31s}$

View Answer

Answer: b

Explanation: $C/R = \frac{G_2 G_1}{1 + G_2 H_2 + G_1 H_1}$

$C/R = \frac{100}{11s^2+31s+100}$.

10. Oscillations in output response is due to :

- a) Positive feedback
- b) Negative feedback
- c) No feedback
- d) None of the mentioned

View Answer

Answer: a

Explanation: Oscillations are the unwanted sinuoidal signals with high gain in positive feedback and s the damping factor is absent in the positive feedback system entirely oscillations are present.

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