

## EE23BTECH11217 - Prajwal M\*

## EXERCISE 9.1

12 For the block diagram shown in the figure, the transfer function  $\frac{Y(s)}{R(s)}$  is

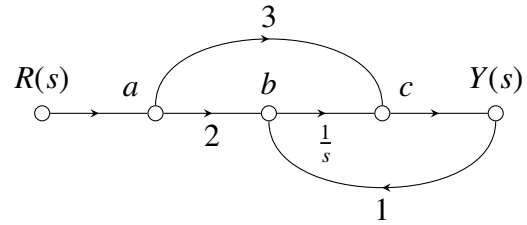


Fig. 2. signal flow graph

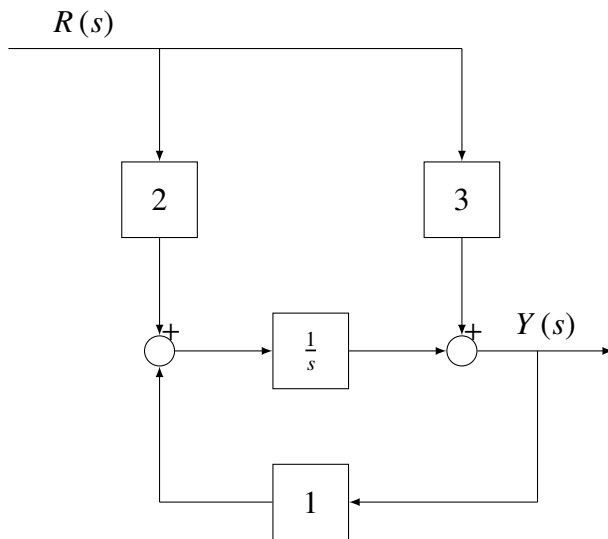


Fig. 1. block diagram

Using Mason's Gain Formula for Fig. 2,

$$\frac{Y(s)}{R(s)} = \frac{\sum_{i=1}^n P_i \Delta_i}{\Delta} \quad (1)$$

$$= \frac{P_1 \Delta_1 + P_2 \Delta_2}{\Delta} \quad (2)$$

$$= \frac{\frac{2}{s} + 3}{1 - \frac{1}{s}} \quad (3)$$

$$\frac{Y(s)}{R(s)} = \frac{3s + 2}{s - 1} \quad (4)$$

Solution:

Parameter	Description	Value
$Y(s)$	Output node variable	
$R(s)$	Input node variable	
$\frac{Y(s)}{R(s)}$	Transfer function	?
$P_1$	Forward path gain a-b-c	$\frac{2}{s}$
$P_2$	Forward path gain a-c	3
$\Delta_1$	Determinant of forward path a-b-c	1
$\Delta_2$	Determinant of forward path a-c	1
$\Delta$	Determinant of system	$1 - \frac{1}{s}$
$n$	Number of forward path	2

TABLE I  
PARAMETERS