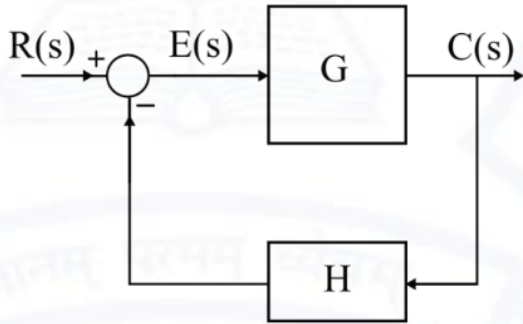# GATE:EE/63

EE23BTECH11208 - Manohar K*

Question: For the closed loop system shown , the transfer function $\frac{E(s)}{R(s)}$ is

(a) $\frac{G}{1+GH}$

(b) $\frac{GH}{1+GH}$

(c) $\frac{1}{1+GH}$

(d) $\frac{1}{1+G}$

(GATE EE 2021)

Solution:
Given,

symbol	description
G	Forward path gain
H	Feedback path gain
$R(s)$	Input signal
$C(s)$	Output signal
$E(s)$	Error signal

TABLE I
PARAMETERS

$$C(s) = G \times E(s) \qquad (1)$$

$$\text{Feedback signal} = H \times C(s) \qquad (2)$$

Error signal = Input signal - Feedback signal

$$E(s) = R(s) - H \times C(s) \qquad (3)$$

$$E(s) = R(s) - H \times G \times E(s) \qquad (4)$$

$$E(s) + H \times G \times E(s) = R(s) \qquad (5)$$

$$\therefore \frac{E(s)}{R(s)} = \frac{1}{1 + GH} \qquad (6)$$