P16: Find the unit step response of the system

P17: Find \( \frac{C(z)}{R(z)} \)

P18: Obtain the discrete time equivalent (or digital equivalent) of the following continuous-time (or analog) filter \( G_c(s) \) by the

(i) backward-diff
(ii) Bilinear transformation
(iii) impulse invariant

methods. The sampling period is \( T = 0.1 \) sec.

\[ G_c(s) = \frac{2}{(s+1)(s+2)} \]

P19: Using the Bilinear transformation and the Bilinear transformation with prewarping, design a low-pass digital filter that has frequency response characteristic similar to that of the following filter

\[ G_c(s) = \frac{10}{s+10} \]

The frequency range of interest is \( 0 \leq \omega \leq 10 \) rad/s. The sampling period is 0.2 sec.

P20: Obtain the discrete equivalent of the following analog filter by the step invariant method.

\[ G_c(s) = \frac{2}{(s+1)(s+10)} \]

\( T = 0.1 \) sec.

P21: Convert the analog filter \( G_c(s) \) given below into a digital filter using

(a) Matched Z-transform
(b) Backward diff
(c) Forward diff. Assume \( T = 0.1 \) sec.

\[ G_c(s) = 20 \frac{s+4}{s+10} \]

P22: Consider the analog control system shown in Figure 3

We wish to convert the analog control system into a digital control system. Design a suitable controller by the Matched Z-transform method. Assume \( T = 0.1 \) sec.