2.3) B.10.6) $G_{(s)} = \dfrac{Y_{(s)}}{U_{(s)}} = \dfrac{10}{(s+1)(s+2)(s+3)} = \dfrac{10}{s^3+3s^2+11s+6}$

Colocando as matrizes na forma controlável:

$$A_{c1} = \begin{bmatrix} -a_2 & -a_1 & -a_0 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} -3 & -11 & -6 \\ 1 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad ; \quad B = \begin{bmatrix} 1 \\ 0 \\ 0 \end{bmatrix}$$

$$C = \begin{bmatrix} a_2 & a_1 & a_0 \end{bmatrix} = \begin{bmatrix} 0 & 0 & 10 \end{bmatrix} \quad ; \quad D = [0]$$

Para os novos polos, calcularemos A_{c2}:

$$\Delta_{(s)} = (s+2+j2\sqrt{3})(s+2-j2\sqrt{3})(s+10) = (s^2+(2+j2\sqrt{3})s+(2-j2\sqrt{3})s)(s+10)$$
$$\Delta_{(s)} = (s^2+4s+16)(s+10) = s^3+14s^2+56s+160$$

$$A_{c2} = \begin{bmatrix} -a_2 & -a_1 & -a_0 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} = \begin{bmatrix} -14 & -56 & -160 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \longrightarrow A_{c2} = A_{c1} - BK$$

$$\begin{bmatrix} -14 & -56 & -160 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} = \begin{bmatrix} -3-K_1 & -11-K_2 & -6-K_3 \\ 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} \begin{matrix} \rightarrow -14 = -3-K_1 \\ \rightarrow -56 = -11-K_2 \\ \rightarrow -160 = -6-K_3 \end{matrix}$$

$$\left.\begin{matrix} K_1 = -3+14 = 11 \\ K_2 = -11+56 = 45 \\ K_3 = -6+160 = 154 \end{matrix}\right\} K = \begin{bmatrix} 11 & 45 & 154 \end{bmatrix} //$$