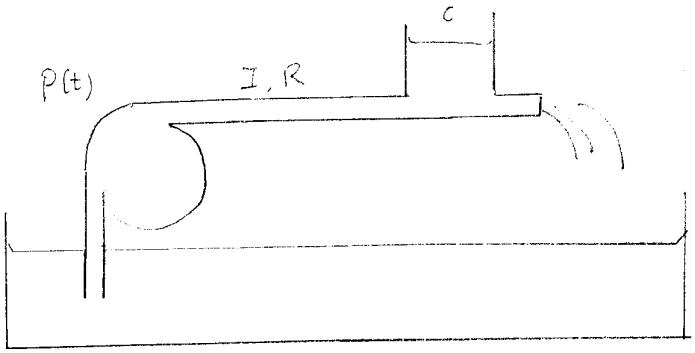

$$\frac{d}{dt}\begin{bmatrix} P_C \\ Q_I \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ -5 & -4 \end{bmatrix}\begin{bmatrix} P_C \\ Q_I \end{bmatrix} + \begin{bmatrix} 0 \\ 4 \end{bmatrix} P(t)$$

(a) Stability

$$\begin{vmatrix} -2-\lambda & 1 \\ -5 & -4-\lambda \end{vmatrix} = (\lambda+2)(\lambda+4)+5$$

$$= \lambda^2 + 6\lambda + 13 = 0$$

$$\lambda_{1,2} = \frac{1}{2}\left[-6 \pm j\sqrt{36-4(13)}\right] = -3 \pm 2j$$

The system is stable, because the real part is negative

(b) Will oscillate because the imaginary part $2j$