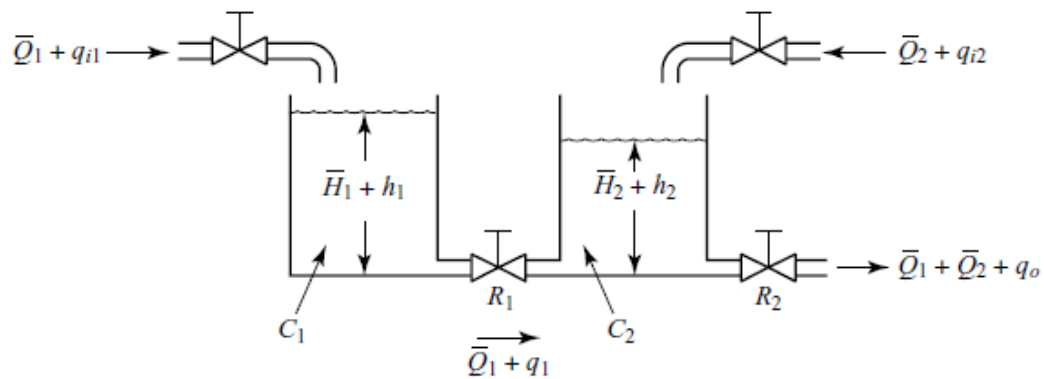# Worksheet-4

1. State Space model of following liquid level system



2. Drive the transfer function of the system shown in following figure. The detail of the system parameters is given below.

The speaker consists of a fixed magnet that produces a uniform magnetic field of strength $\beta$. The speaker has a cone with mass (M), that moves in the $x$ direction. The cone is modelled with a spring (K) to return it to its equilibrium position, and a friction (B). Attached to the cone, and within the magnetic field is a coil of wire or radius "a." The coil consists of "n" turns and it moves along with the cone. The wire has resistance (R) and inductance (L).
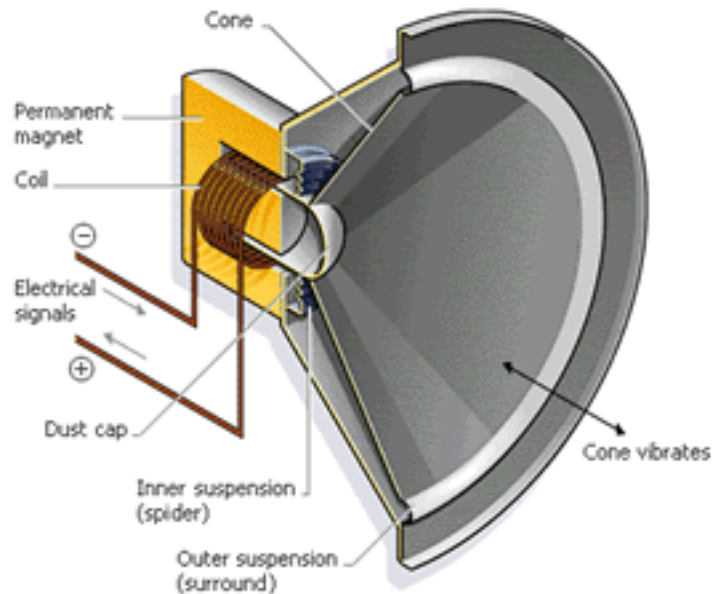


3. Consider a mechanical translational system shown in figure below. Drive the state space model of the system. Where $f(t)$ is input of the system and $x_1$ and $x_2$ are the outputs.