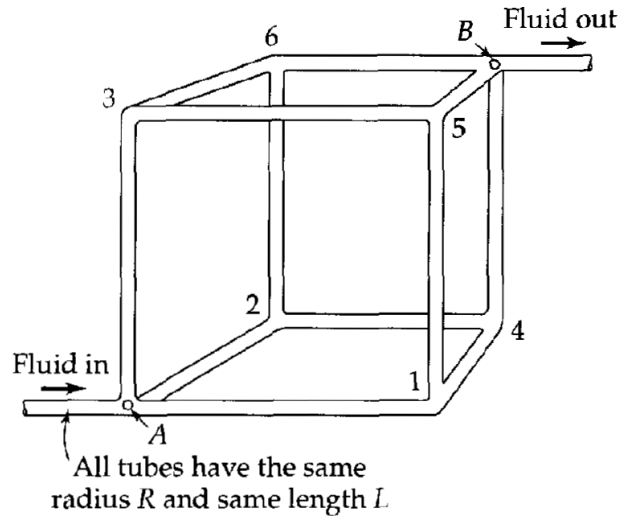


### Problem 2B.12

**Flow of a fluid in a network of tubes** (see Fig. 2B.12). A fluid is flowing in laminar flow from  $A$  to  $B$  through a network of tubes, as depicted in the figure. Obtain an expression for the mass flow rate  $w$  of the fluid entering at  $A$  (or leaving at  $B$ ) as a function of the modified pressure drop  $\mathcal{P}_A - \mathcal{P}_B$ . Neglect the disturbances at the various tube junctions.

$$\text{Answer: } w = \frac{3\pi(\mathcal{P}_A - \mathcal{P}_B)R^4\rho}{20\mu L}$$



**Fig. 2B.12** Flow of a fluid in a network with branching.