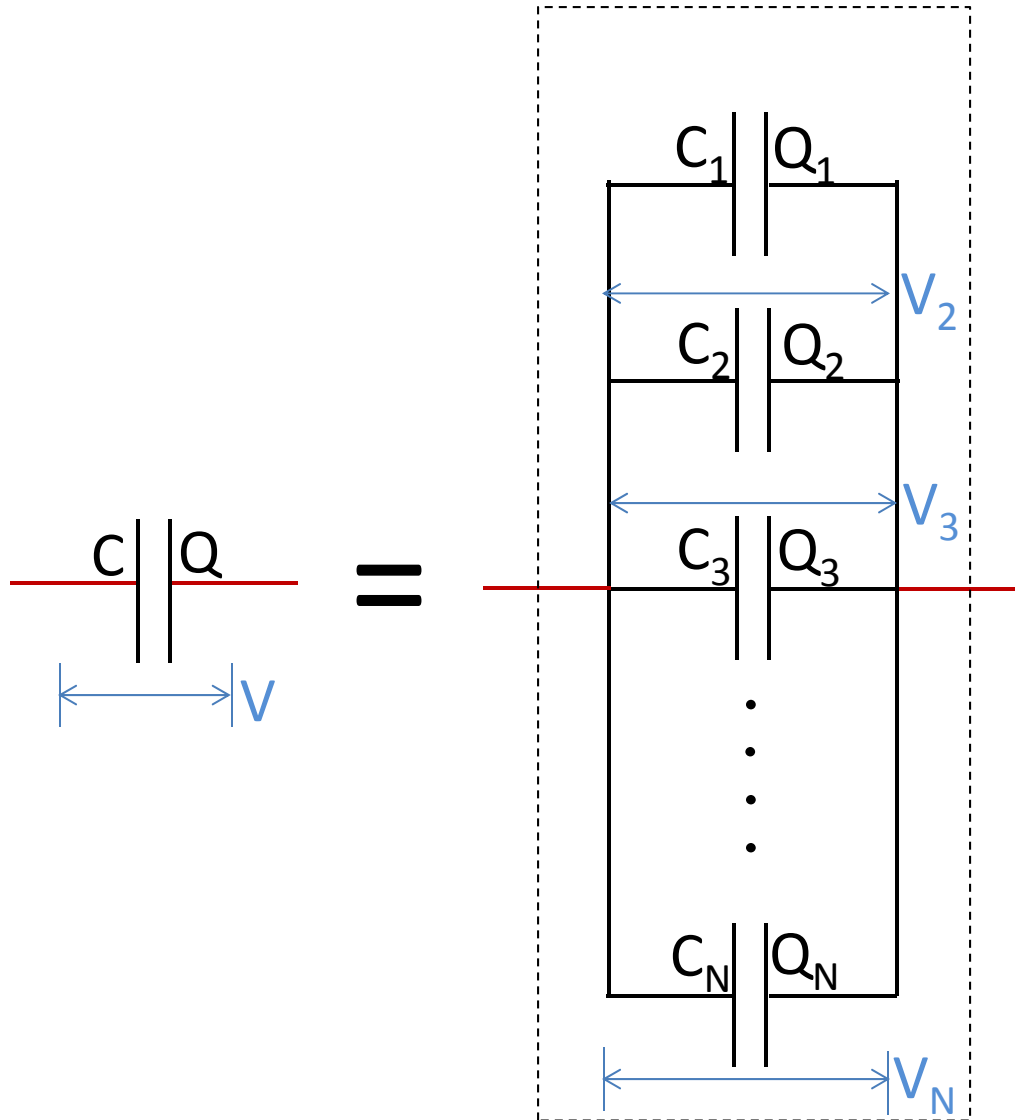


## Class 15: Capacitors in Parallel and in Series

## Connecting Capacitors in Parallel



$$C = C_1 + C_2 + C_3 + \dots C_N$$

$$Q = Q_1 + Q_2 + Q_3 + \dots Q_N$$

$$V = V_1 = V_2 = V_3 = \dots V_N$$

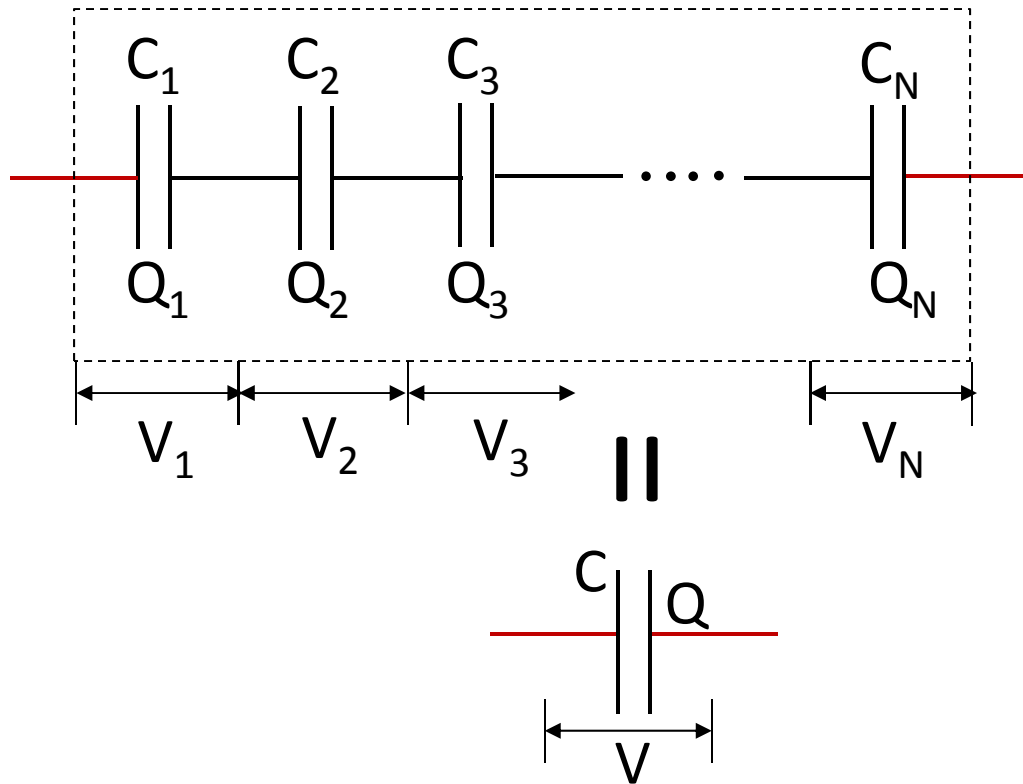
1. Potential difference across each individual capacitor is the same: (why?)

$$V = V_1 = V_2 = V_3 = \dots V_N$$

$$\Rightarrow \frac{Q_1}{C_1} = \frac{Q_2}{C_2} = \frac{Q_3}{C_3} = \dots \frac{Q_N}{C_N}$$

2. Charge stored in each individual capacitor should be different (unless they have the same capacitance).

## Connecting Capacitors in Series



$$\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2} + \frac{1}{C_3} + \dots + \frac{1}{C_N}$$
$$Q = Q_1 = Q_2 = Q_3 = \dots = Q_N$$
$$V = V_1 + V_2 + V_3 + \dots + V_N$$

1. Charge stored in each individual capacitor is the same: (why?)

$$Q = Q_1 = Q_2 = Q_3 = \dots = Q_N$$
$$\Rightarrow CV = C_1 V_1 = C_2 V_2 = C_3 V_3 = \dots = C_N V_N$$

2. Potential difference across each individual capacitor should be different (unless they have the same capacitance).