Clear! A defibrillator uses a 250 μF capacitor charged to a potential difference of 1000 V. If all the charge on the capacitor is delivered to the patient during a time interval of 5.0×10−2 s, determine the resistance associated through the patient's chest.

Solution

Since the charging curve for a RC charging circuit is exponential $(t) = V_0 e^{-\frac{t}{RC}}$, the capacitor in reality never becomes 100% fully charged. Thus for all practical purposes, approximately after five time constants a capacitor is considered to be fully charged.

The time constant for RC circuit $\tau = RC$.

The capacitor will be fully charged at 5 time constants

$$t = 5\tau.$$

So

$$R = \frac{\tau}{C} = \frac{t}{5C} = \frac{5 \times 10^{-2}}{5 \times 250 \times 10^{-6}} = 40 \ \Omega.$$

Answer $R = 40 \ \Omega$.

Answer provided by https://www.AssignmentExpert.com