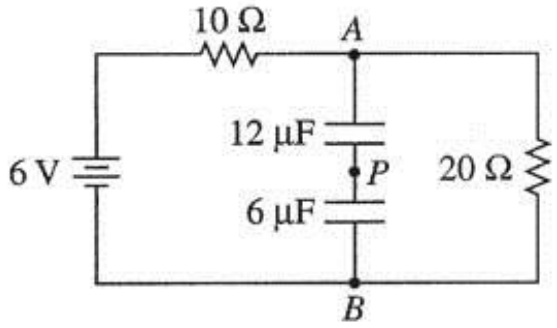


2003B2 A circuit contains two resistors (10 Ω and 20 Ω) and two capacitors (12 μF and 6 μF) connected to a 6 V battery, as shown in the diagram above. The circuit has been connected for a long time.

a. Calculate the total capacitance of the circuit.

b. Calculate the current in the 10 Ω resistor.

c. Calculate the potential difference between points A and B.

d. Calculate the charge stored on one plate of the 6 μF capacitor.

e. The wire is cut at point P. Will the potential difference between points A and B increase, decrease, or remain the same?

2002B3 Two lightbulbs, one rated 30 W at 120 V and another rated 40 W at 120 V, are arranged in two different circuits.

a. The two bulbs are first connected in parallel to a 120 V source.

   i. Determine the resistance of the bulb rated 30 W and the current in it when it is connected in this circuit.

   ii. Determine the resistance of the bulb rated 40 W and the current in it when it is connected in this circuit.

b. The bulbs are now connected in series with each other and a 120 V source.

   i. Determine the resistance of the bulb rated 30 W and the current in it when it is connected in this circuit.

   ii. Determine the resistance of the bulb rated 40 W and the current in it when it is connected in this circuit.

c. In the spaces below, number the bulbs in each situation described, in order of their brightness.

   (1= brightest, 4 = dimmest)

   ____30 W bulb in the parallel circuit

   ____40 W bulb in the parallel circuit

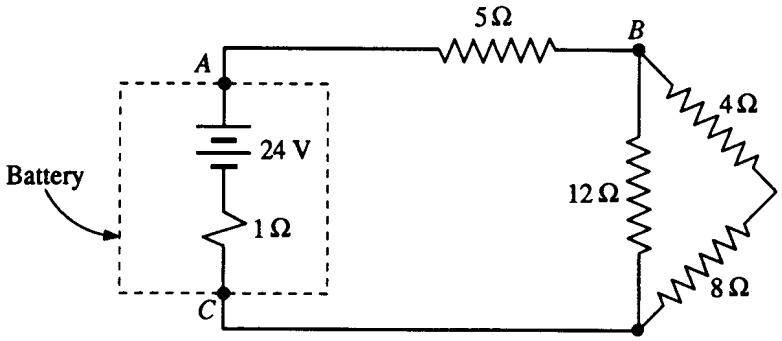
   ____30 W bulb in the series circuit

   ____40 W bulb in the series circuit

d. Calculate the total power dissipated by the two bulbs in each of the following cases.

   i. The parallel circuit

   ii. The series circuit



1990B3. A battery with an emf of 24 volts and an internal resistance of 1 ohm is connected to an external circuit as shown above. Determine each of the following:

a. the equivalent resistance of the combination of the 4-ohm, 8-ohm, and 12-ohm resistors

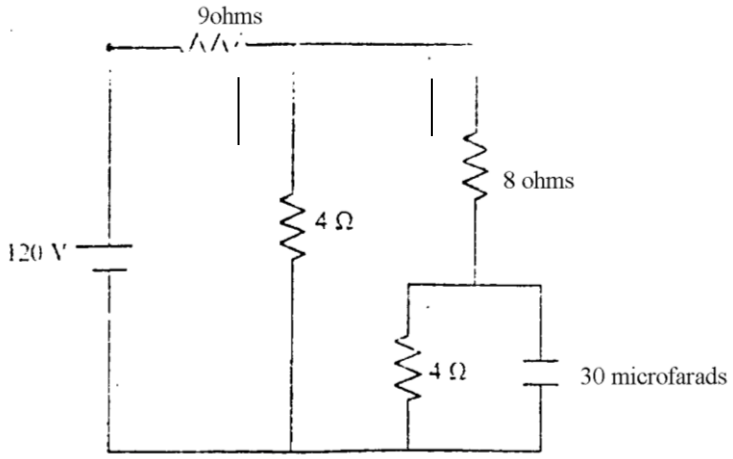
b. the current in the 5-ohm resistor

c. the terminal voltage, V_{AC} of the battery

d. the rate at which energy is dissipated in the 12-ohm resistor

e. the magnitude of the potential difference V_{BC}

f. the power delivered by the battery to the external circuit



1988E2. In the circuit shown above. the battery has been connected for a long time so that the currents have steady values. Given these conditions, calculate each of the following

a. The current in the 9-ohm resistor.
b. The current in the 8-ohm resistor.
c. The potential difference across the 30-microfarad capacitor.
d. The energy stored in the 30-microfarad capacitor.