2021 Ph H1 Q24

Section: Electricity

Topic: Capacitors

Question Summary

A 20 μF capacitor is connected in a circuit with two equal 16 Ω resistors across a 12 V supply (as in the paper diagram). What is the maximum charge stored by the capacitor?

Worked Solution

At steady d.c., the capacitor is open circuit and charges to the p.d. between the two equal resistors in the divider.

Voltage at the midpoint of two equal resistors across 12 V is 6.0 V.
$Q = C\,V = (20 \times 10^{-6}\ \text{F}) \times (6.0\ \text{V}) = 1.2 \times 10^{-4}\ \text{C}$.

Final Answer: C

Revision Tips

- In steady d.c. conditions, capacitors act as open circuits.
- Equal resistors in a divider split the supply: midpoint is half the supply voltage.
- Use Q = C V once the final capacitor voltage is known.