2021 Ph H1 Q25

Section: Electricity

Topic: Capacitors

Question Summary

A capacitor-resistor circuit is timed to full charge, then R is increased and the process repeated. What happens to the time to fully charge and to the maximum energy stored?

Worked Solution

Time constant $\tau = R\,C$. Increasing R increases τ, so the time to fully charge increases.

Maximum energy $E_{max} = \frac{1}{2} C V^2$. Changing R does not affect the supply voltage or C, so E_{max} stays the same.

Final Answer: D

Revision Tips

- Charging time $\propto RC$ (increase R $\Rightarrow$ slower charging).
- Maximum energy depends only on C and supply V: $E = \frac{1}{2} C V^2$.
- R affects rate, not final energy.