GET BETTER AT PHYSICS · MARK SCHEME

Charging & Discharging Capacitors: tiered multiple choice

Edexcel IAL Physics · Unit 4 (WPH14) · Specification points 102–104 · 4 questions · 4 marks

1 mark per correct letter | Worked reasoning for every question

How students did = from Pearson examiner reports, where available

Answer key

Q1	Q2	Q3	Q4
C	D	B	D

Easy

Questions 1–4

1 **C**

Charging a capacitor through a resistor · Edexcel IAL January 2021 · Unit 4 · Q5

As the capacitor charges, its charge rises quickly at first and then levels off (exponential growth towards a maximum). The current falls as the capacitor charges, so the p.d. across the resistor (V = IR) decays from its maximum towards zero.

2 **D**

Time constant from a discharge · Edexcel IAL June 2024 · Unit 4 · Q6

$V = V_0e^{-t/RC}$. Taking logs: $\ln(V/V_0) = -t/RC$, so the time constant $RC = -t / \ln(V/V_0)$. ($\ln(V/V_0)$ is negative, so RC comes out positive.)

How students did: 67% of students got this right in June 2024.

3 **B**

Capacitance from a graph of ln I against time · Edexcel IAL January 2021 · Unit 4 · Q10

$I = I_0e^{-t/RC}$, so $\ln I = \ln I_0 - t/(RC)$. The gradient of ln I against t is $-1/(RC)$, so $C = -1/(\text{gradient} \times R)$.

4 **D**

Time for the charge to halve · Edexcel IAL October 2023 · Unit 4 · Q9

$Q = Q_0e^{-t/RC}$. When $Q = Q_0/2$: $e^{-t/RC} = ½$, so $t = RC \ln 2 = 5 \ln 2$ s.

How students did: 58% of students got this right in October 2023.

End of mark scheme. Answers from Pearson's published mark schemes; explanations written for this pack. Pearson Edexcel material is © Pearson Education Ltd. More free packs and 1-to-1 tuition: **www.getbetteratphysics.co.uk**

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