2017 H2 Q14

Section: Electricity

Topic: Photovoltaic effect • Solar cell I–V curve

(a) Name the effect that produces a potential difference in a p–n junction when light shines on it.

Answer: Photovoltaic effect.

(b) Using the I–V graph for a solar cell

(i) Estimate the maximum power output from the graph.

When V = 2.1 V, the current is 32 mA.

Power: $P = VI = 2.1 \times 32 \times 10^{-3} = 0.067$ W.

(ii) Explain why the power increases as the lamp is brought closer to the solar cell.

As the lamp is brought closer, the flux of photons striking the solar cell increases. This causes more electrons to be released, so the current increases proportionately. Hence the power output increases (P = VI).