Exam Papers Practice

Quantum Physics

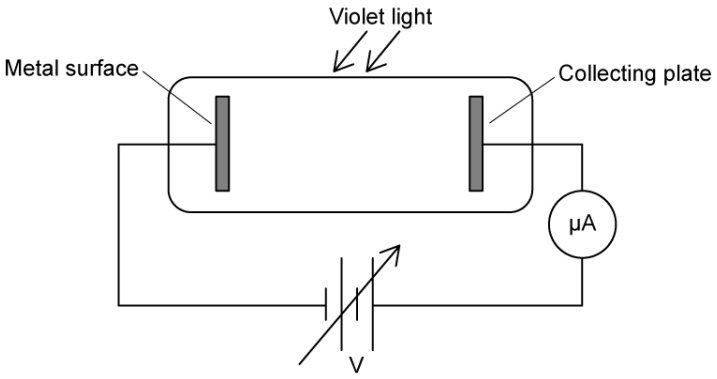
Question Paper

Course	HL IB Physics
Section	Nuclear & Quantum Physics
Topic	Quantum Physics
Difficulty	Medium

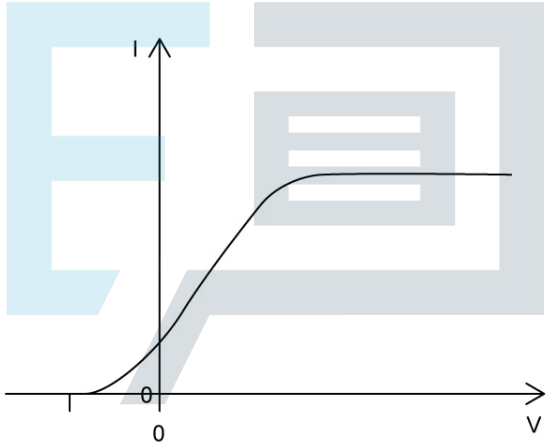
To be used by all students preparing for HL IB Physics
Students of other boards may also find this useful

Question 1

Violet light is incident on a metal surface, producing photoelectrons.

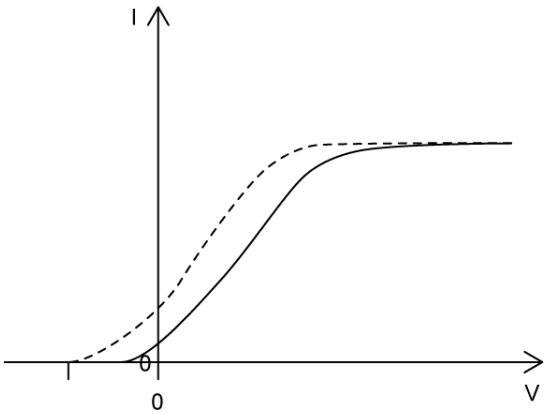


The variation of photocurrent *I* with potential difference *V* is shown.

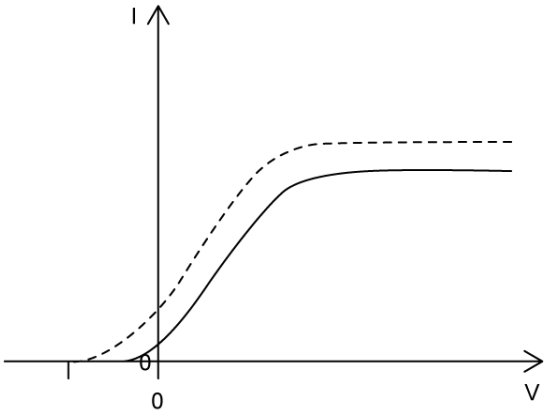


The light source is changed to red light of the same intensity as the violet light. Which graph shows the variation of photocurrent *I* with potential difference *V* for the red light? The results for the violet light are shown as a dashed line.

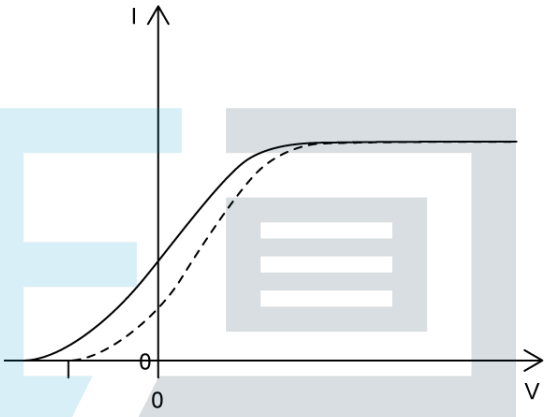
A.



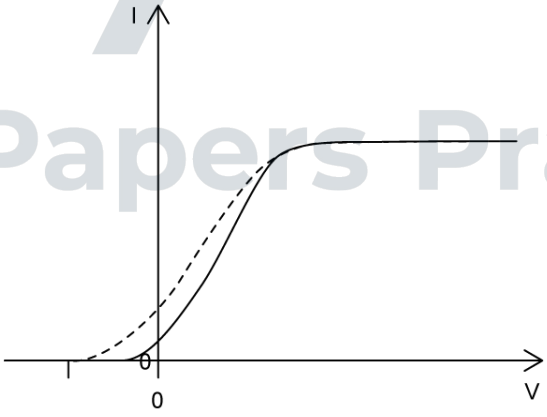
B.



C.



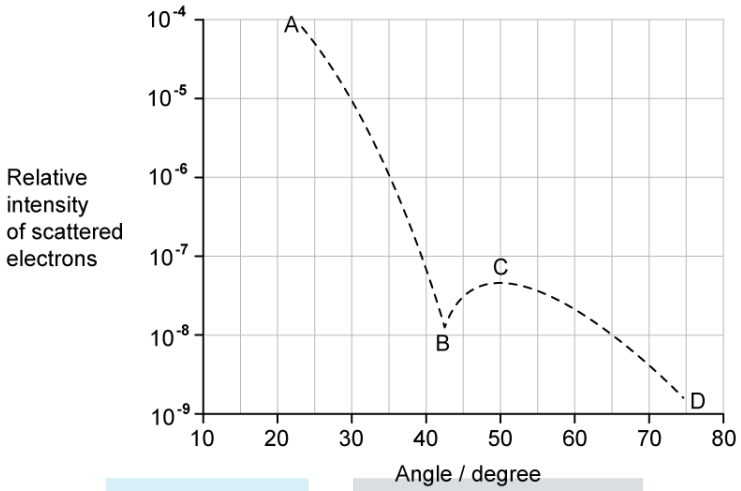
D.



[1 mark]

Question 2

The graph shows the scattering of electrons due to diffraction by oxygen-16 nuclei.



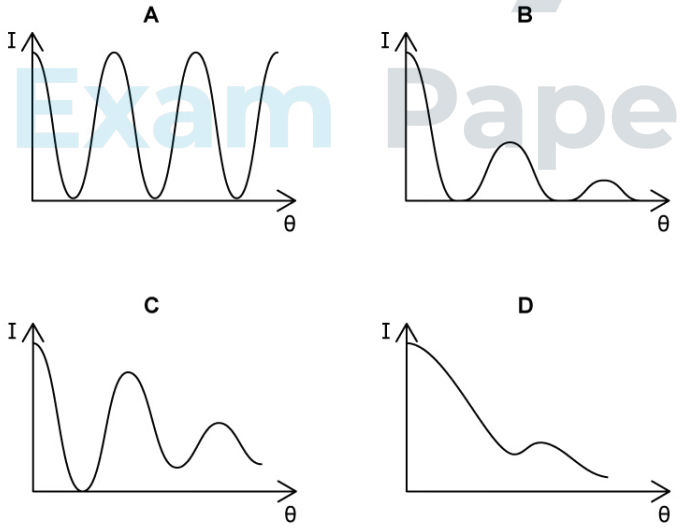
Which point on the graph represents the first minimum?

[1 mark]

Question 3

Which graph shows how intensity *I* varies with angle θ when electrons are diffracted by a nucleus?

[1 mark]



Question 4

At which scattering angle is the maximum energy transferred to an electron by a photon during Compton scattering?

A. 0°

B. 45°

C. 90°

D. 180°

[1 mark]

Question 5

A photon of energy E and wavelength λ strikes a stationary electron and transfers a fraction of its energy as it scatters. The scattered photon has a wavelength of λ'.

What is the speed of the recoiling electron?

A. $\sqrt{\frac{2\lambda'}{m_e\lambda}}$

B. $\sqrt{\frac{2\lambda}{m_e\lambda'}}$

C. $\sqrt{\frac{2E}{m_e}\left(\frac{\lambda' - \lambda}{\lambda'}\right)}$

D. $\sqrt{\frac{2E}{m_e}\left(\frac{\lambda' - \lambda}{\lambda}\right)}$

[1 mark]