7 In an experiment, incident photons that enter a tube strike a metal surface, resulting in electrons being ejected. By counting the number of collected electrons, the number of incident photons can be determined.

(a) State the phenomenon where electrons are ejected from a metal irradiated with light.

…….. [1]

(b) Determine the maximum kinetic energy of the ejected electrons if monochromatic light of wavelength 500 nm is incident on a metal of work function of 1.0 eV.

maximum kinetic energy = ……. eV [2]

(c) Hence, calculate the maximum momentum of the ejected electrons.

maximum momentum = ……..……. N s [2]

(d) A laser light of wavelength 500 nm and power 25 x 10^{-6} W is incident onto the metal.
The probability of a photon ejecting an electron from the metal is 20%.
Calculate the electron current produced, assuming all electrons are collected.

electron current = ……..……. A [3]

(e) The metal chosen for this experiment is required to eject electrons when irradiated with light of all incident wavelengths throughout the visible light range (400 nm to 700 nm).
Determine the maximum value for the work function of this metal.

maximum work function of metal = ……..……. eV [2]

[Total: 10]

End of Paper 3 Section A