6 **(a)** State an experimental phenomenon that provides evidence for the wave nature of matter.

……..… [1]

(b) Electrons are accelerated from rest through a potential difference of 4.8 kV.

Calculate the de Broglie wavelength of the beam of electrons.

wavelength = ... m [3]

(c) A polished calcium plate in a vacuum is investigated by illuminating the surface with light. It is found that no photoelectric current is produced when the frequency of the light is less than 6.93×10^{14} Hz.

(i) Explain how the particulate nature of electromagnetic radiation accounts for this phenomenon.

…...…….

…...…….

…...…….

…...…….

…...…… [3]

(ii) Calculate the work function of calcium.

work function = ... eV [2]

[Total: 9]