5. In a photoelectric experiment, monochromatic ultraviolet light of wavelength 60 nm and intensity 0.7 ~~m~~W m^{-2} is incident onto a cathode which has a surface area of 10 cm^2. It is found that the photoelectric current decreases to zero when the anode has a **negative** potential of 4.25 V with respect to the cathode. When the anode is at a positive potential with respect to the cathode, the saturation photoelectric current is 21.7 ~~m~~μA.

(a) Calculate the linear momentum of the photoelectrons which are emitted with the maximum kinetic energy.

[3 marks]

[1.114×10^{-24} Ns]

(b) What is the ratio of $\frac{N_e}{N_p}$ where N_e & N_p are the rate of emission of photoelectrons and number of photon incident onto the cathode per second?

[3 marks]

[0.6415]

(c) One of the electrons with maximum kinetic energy makes a collision with a hydrogen atom which is in the ground state. What are the possible wavelengths of the photon emitted when the hydrogen atom de-excite?

[4 marks]

[Show that the energy of the electron is not sufficient to excite the hydrogen atom from ground sate to the first excited state. Hence, no emission of spectral lines is possible.]

[The energy of hydrogen atom in the stationary states with principal quantum number n is $-\frac{13.6}{n^2}$ eV.]

Note: Responses were graded based on erroneous values given in the original question. Corrections are in RED.