4 (a) State what is meant by the *photoelectric effect.*

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…………………………………………………………………………………………………..…………[1]

(b) Use the theory of the particulate nature of electromagnetic radiation to explain why there is a threshold frequency for the photoelectric effect.

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…………………………………………………………………………………………………..…………[3]

(c) A circuit was used to investigate the photoelectric effect as shown in Fig. 4.1
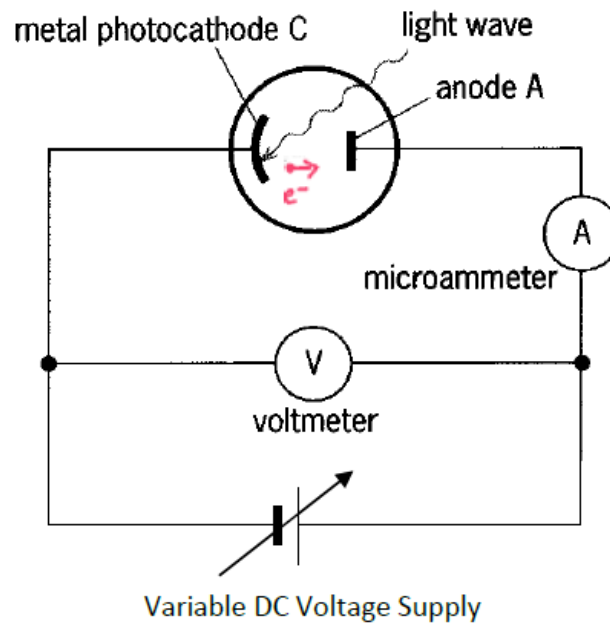

Fig 4.1

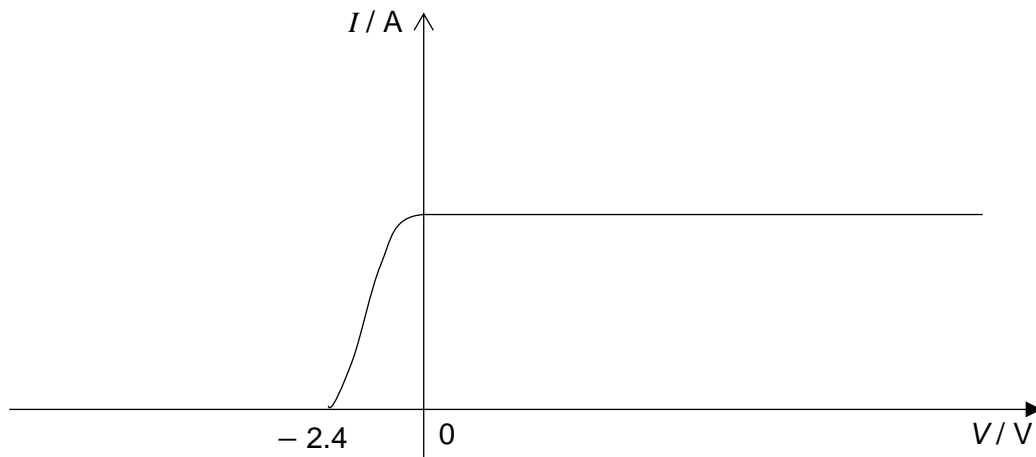The variation with potential difference *V* of current *I* is shown in Fig. 4.2

Fig. 4.2

(i) Explain why there is a minimum stopping potential difference V_s to reduce the current to zero.

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.……………………………………………………………………………………………………[1]

(ii) Explain why the current does not continue to increase for positive values of *V*.

………………………………………………………………………………………………....

.……………………………………………………………………………………………………[1]

(iii) The work function of anode A is 1.6 eV. Use Fig. 4.2 to calculate the frequency of the electromagnetic radiation used.

frequency = …………………………………………….. Hz [2]

(iv) The frequency of the electromagnetic radiation is kept constant as its intensity is doubled. On Fig. 4.2 sketch a graph to show the variation with *V* of *I* for this increase in intensity.　　[2]

[Total: 10]

[Turn over