6 Figure 6.1 shows the end of an electron diffraction tube.

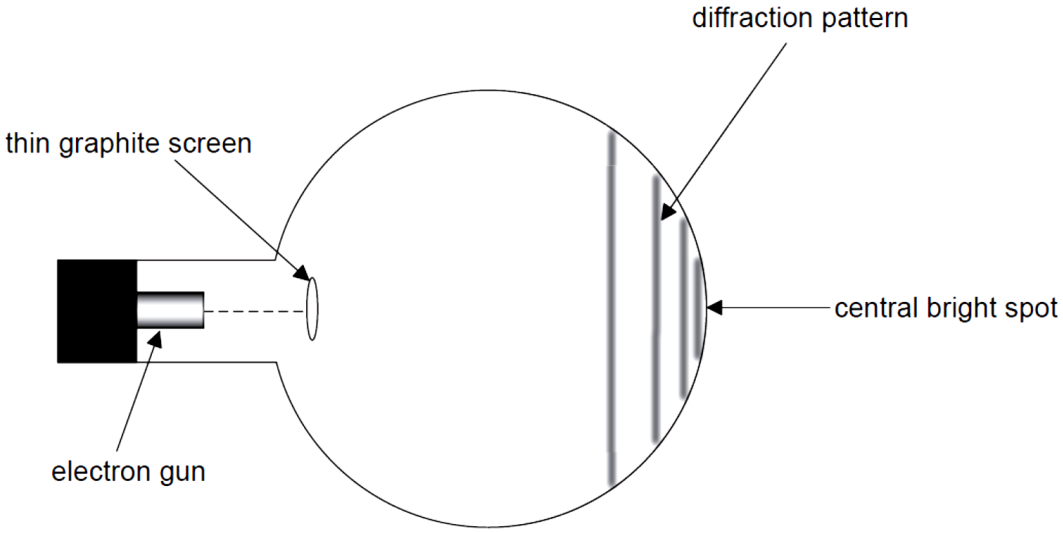

Fig. 6.1

A diffraction pattern of concentric circles forms when diffracted electrons are incident on a fluorescent layer at the end of the tube.

(a) **(i)** Explain the meaning of the term diffraction

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.....

..... [1]

(ii) State the condition necessary for electrons to produce observable diffraction when passing through matter, e.g. a thin sheet of graphite.

.....

.....

..... [1]

(b) An electron with charge − q and mass m is made to accelerate from rest in the above evacuated tube through a potential difference of 120 V.

(i) State what is meant by the *de Broglie wavelength*.

.....

.....

.....

..... [1]

(ii) Calculate the de Broglie wavelength of the electron.

de Broglie wavelength = ... m [4]

(iii) The potential difference V is now increased slightly. State and explain how the diffraction pattern that forms would change.

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..... [3]

Section B

Answer **one** question in this section in the spaces provided.