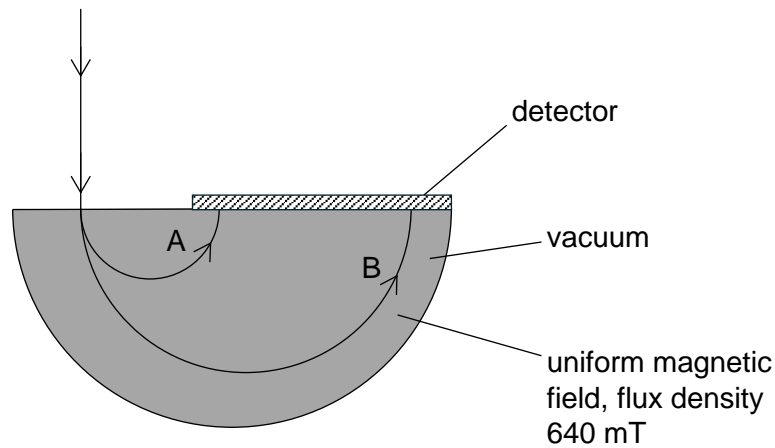


- 6 (a) Explain the use of a uniform electric field and a uniform magnetic field for the selection of the velocity of a charged particle. You may draw a diagram if you wish.

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

- (b) Ions, all of the same isotope, are travelling in a vacuum with a speed of  $9.6 \times 10^4 \text{ m s}^{-1}$ . The ions are incident normally on a uniform magnetic field of flux density 640 mT. The ions follow semicircular paths A and B before reaching a detector, as shown in Fig. 6.1.



**Fig. 6.1**

Data for the diameters of the paths are shown in Fig. 6.2.

path	diameter / cm
A	4.1
B	12.3

**Fig. 6.2**

The ions in path B each have charge  $+1.6 \times 10^{-19} \text{ C}$ .

- (i) Determine the mass, in u, of the ions in path B. Explain your working.

mass = ..... u [3]

- (ii) Suggest and explain quantitatively a reason for the difference in the radii of the paths A and B of the ions.

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

[Total: 9]