6 **(a)** Define *magnetic flux density.*

....

....

.... [1]

(b) While inside a uniform magnetic field of magnetic flux density *B*, a particle of charge *q* and mass *m* has velocity of *v* and makes an angle of *θ* with the field as shown in Fig. 6.4.
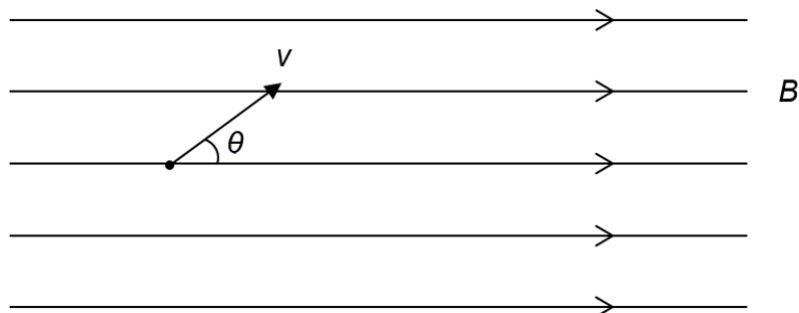

Fig. 6.4

(i) Explain why the particle will trace a helical path.

....

....

....

.... [2]

(ii) Show that the radius *r* of the helical path is given by the expression

$$r = \frac{m\,v\,\sin\theta}{B\,q}$$

[3]

(iii) Hence, or otherwise, show that the period of each cycle of the helical path is independent of θ.

[2]

[Total : 8]