

BCM SCHOOL, BASANT AVENUE, DUGRI
ANSWER KEY
CHAPTER - MOVING CHARGES & MAGNETISM

1 - (b)

6 - (c)

2 - (b)

7 - (a)

3 - (a)

8 - (b)

4 - (b)

9 - (a)

5 - (a)

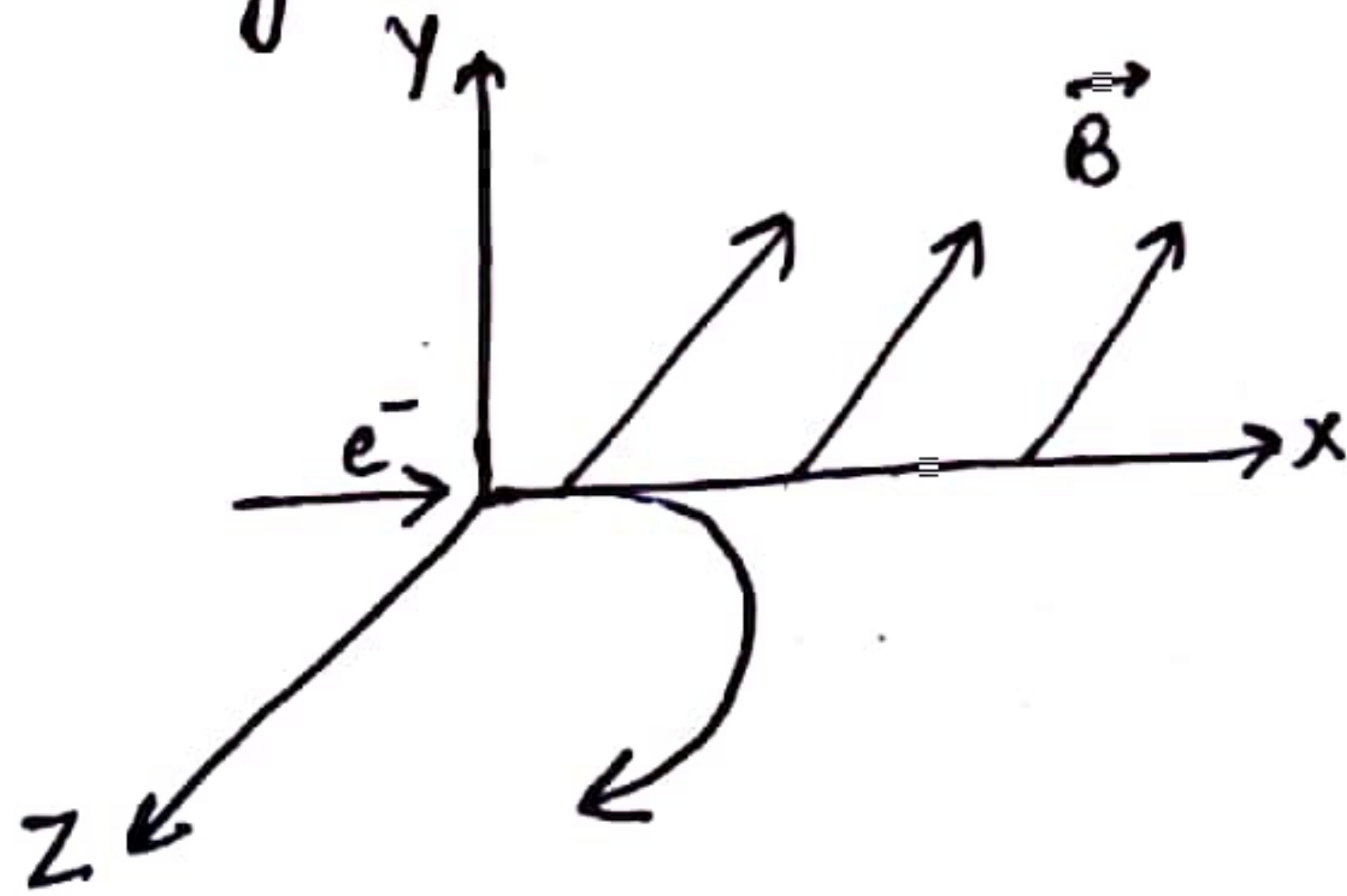
10 - Assertion is False, Reason is true.

11 - Derivation

$$12 - T = \frac{\pi r}{v} = \frac{\pi}{v} \left(\frac{mv}{qB} \right) = \frac{\pi m}{qB}$$

Work done by the magnetic field is zero.

13 -



14. $V = 10 \text{ kV}$
 $B = 2 \times 10^{-3} \text{ T}$

$$q = +2e$$

$$r = \frac{\sqrt{2mqV}}{qB} = \frac{\sqrt{2 \times 6.4 \times 10^{-27} \times 2 \times 1.6 \times 10^{-19} \times 10^4}}{2 \times 1.6 \times 10^{-19} \times 2 \times 10^{-3}} = 100 \text{ m.}$$

15. V is same

	$\frac{p}{e}$	$\frac{d}{e}$	$\frac{\alpha}{2e}$
$q \rightarrow$	e	e	$2e$
$m \rightarrow$	m	$2m$	$4m$

$$K \cdot E = qV$$

$$K \cdot E \propto q$$

$$(K \cdot E)_p : (K \cdot E)_d : (K \cdot E)_\alpha = e : e : 2e = 1 : 1 : 2$$

$$\frac{r_d}{r_p} = \sqrt{\frac{m_d}{m_p} \times \frac{q_p}{q_d}}$$

$$\left[\because r_d \propto \sqrt{\frac{m}{q}} \right] \text{acc. to formula } r = \frac{\sqrt{2mqV}}{qB}$$

$$\frac{r_d}{5} = \sqrt{\frac{2m}{e} \times \frac{e}{m}}$$

$$r_d = 5\sqrt{2} \text{ cm}$$

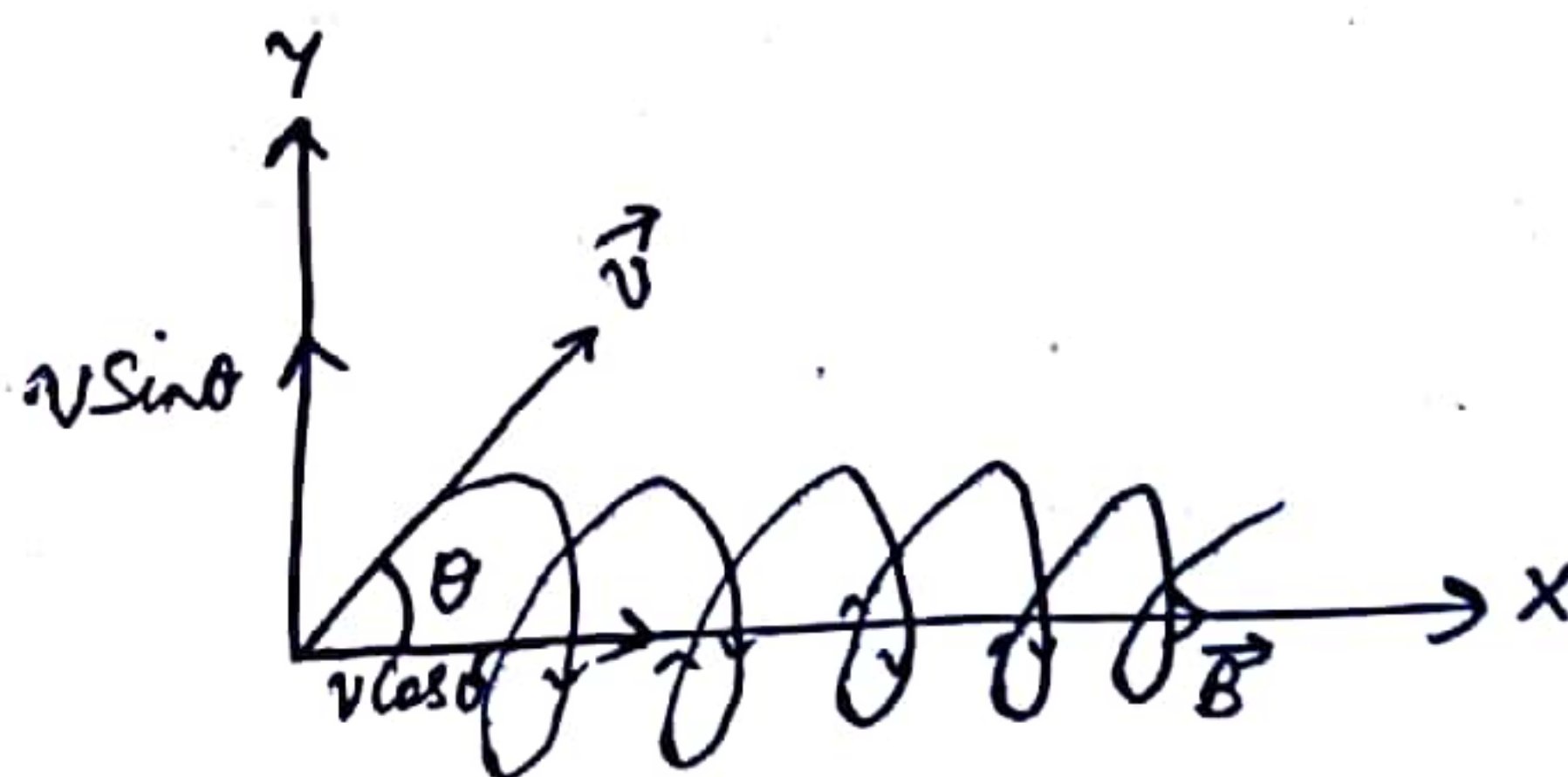
$$\frac{r_\alpha}{r_p} = \sqrt{\frac{m_\alpha}{m_p} \times \frac{q_p}{q_\alpha}} = \sqrt{\frac{4m}{2e} \times \frac{e}{m}}$$

$$r_\alpha = 5\sqrt{2} \text{ cm}$$

16.

$$v_{||} = v \cos \theta$$

$$v_{\perp} = v \sin \theta$$



$$(F_x) = q v_{||} B \sin 0^\circ = 0$$

$$F_y = q(v_{\perp}) B \sin 90^\circ = \text{max.}$$

Due to $v_{||}$, no force is acting along X-axis. So charged particle will follow straight line path. Due to $v_{\perp}$ component, max. force is acting. So it will follow circular path along -Z axis. Therefore, resultant path will be helical.

