1. Two ions having same mass have charges in the ratio 1 : 2. They are projected normally in a uniform magnetic field with their speeds in the ratio 2 : 3. The ratio of the radii of their circular trajectories is : [July 25, 2021 (II)]

(a) 1 : 4   (b) 4 : 3   (c) 3 : 1   (d) 2 : 3

ans

(b) Given,

$$\frac{q_1}{q_2} = \frac{1}{2} \ \& \ \frac{v_1}{v_2} = \frac{2}{3}$$

Radius of circular path,

$$R = \frac{mv}{qB} \ \text{Where,}$$

m = mass of charged particle
B = magnetic field

$$\therefore \ \frac{R_1}{R_2} = \frac{\dfrac{mv_1}{Q_1B}}{\dfrac{mv_2}{Q_2B}} = \frac{v_1}{v_2} \times \frac{q_2}{q_1} = \frac{2}{3} \times \frac{2}{1} = \frac{4}{3}$$