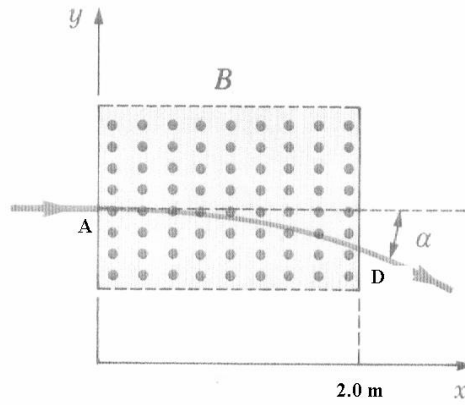(b)

Fig. 1

A beam of proton with kinetic energy 10 MeV is travelling in the positive $x-$ direction. It enters a magnetic field of magnitude 1.5 T and the direction of the magnetic field is in the positive $z-$ direction. The magnetic field extends from $x=0$ to $x=2.0$ m as shown in Fig. 1. Determine the angle α between the initial velocity vector of the proton beam and the velocity vector after the beam emerges from the magnetic field. [7 marks]