QUES 05:-

A beam of protons with speed 4×10^5 ms^{-1} enters a uniform magnetic field of 0.3 T at an angle of 60° to the magnetic field. The pitch of the resulting helical path of protons is close to : (Mass of the proton = 1.67×10^{-27} kg, charge of the proton = 1.69×10^{-19} C) [Main Sep. 02, 2020 (I)]

(a) 2 cm (b) 5 cm
(c) 12 cm (d) 4 cm

(d) Pitch $= (v\cos\theta)T$ and $T = \dfrac{2\pi m}{qB}$

$\therefore$ Pitch $= (V\cos\theta)\dfrac{2\pi m}{qB}$

$= (4\times10^5\cos 60°)\dfrac{2\pi}{0.3}\left(\dfrac{1.67\times10^{-27}}{1.69\times10^{-19}}\right) = 4$ cm