Q 02 A charged particle would continue to move with a constant velocity in a region wherein,

a. $E = O, B \neq O$.
b. $E \neq O, B \neq O$.
c. $E \neq O, B = O$
d. $E = O, B = O$

Sol. (a), (b) and (d) are correct.

This problem is based upon the single moving charge placed with some uniform electric and magnetic fields in space. Then they experience a force called Lorentz force is $F_{net} = qE + q(v \times B)$.

Force experienced by the charged particle due to electric field $F_e = qE$

Force experienced by the charged particle due to magnetic field, $F_m = q(v \times B)$

According to the problem, the particle is moving with constant velocity means acceleration of the particle is zero and also it is not changing its direction of motion.

This will happen when the net force on the particle is zero.

i. if $E = O$ and $v \parallel B$, then $F_{net} = O$
ii. if $E \neq O$, $B \neq O$ and E, v and B are mutually perpendicular.
And (ii) when both E and B are absent.