EECS 221

S.P. 3-C

Using a point charge $Q = 2\mu\text{C}$, two experiments are conducted at a point P.

1) In the first case, Q is held stationary and it found that the force needed to keep it stationary is: $\mathbf{F}_1 = 4\hat{\mathbf{a}}_x - 3\hat{\mathbf{a}}_y + 2\hat{\mathbf{a}}_z$ [μN]

2) In the second case, Q is moved through P in a number of directions at a speed of 10 cm/s and the force $\mathbf{F}_2$ needed to keep Q on that path is monitored. It is found that $|\mathbf{F}_2 - \mathbf{F}_1|$ is maximized when the velocity is along the direction $\hat{\mathbf{a}}_u = \frac{1}{\sqrt{5}}\left[\hat{\mathbf{a}}_x - 2\hat{\mathbf{a}}_y\right]$ and

$\mathbf{F}_2 = -3\hat{\mathbf{a}}_x + 2\hat{\mathbf{a}}_y - \hat{\mathbf{a}}_z$ [μN]

What are the values of **E** and **B** at P?