3. A charged particle carrying charge 1 μC is moving with velocity $(2\hat{i}+3\hat{j}+4\hat{k})$ ms^{-1}. If an external magnetic field of $(5\hat{i}+3\hat{j}-6\hat{k})\times10^{-3}$ T exists in the region where the particle is moving then the force on the particle is $\vec{F}\times10^{-9}$ N. The vector $\vec{F}$ is : **[Sep. 03, 2020 (I)]**

(a) $-0.30\hat{i}+0.32\hat{j}-0.09\hat{k}$

(b) $-30\hat{i}+32\hat{j}-9\hat{k}$

(c) $-300\hat{i}+320\hat{j}-90\hat{k}$

(d) $-3.0\hat{i}+3.2\hat{j}-0.9\hat{k}$

3. **(a)** [Given: $q = 1\mu C = 1\times10^{-6}\,C$;

$\vec{V} = (2\hat{i} + 3\hat{j} + 4\hat{k})$ m/s and

$\vec{B} = (5\hat{i} + 3\hat{j} - 6\hat{k}) \times 10^{-3}$ T]

$$\vec{F} = q(\vec{V} \times \vec{B}) = 10^{-6} \times 10^{-3} \begin{vmatrix} \hat{i} & \hat{j} & \hat{k} \\ 2 & 3 & 4 \\ 5 & 3 & -6 \end{vmatrix}$$

$$= (-30\hat{i} + 32\hat{j} - 9\hat{k}) \times 10^{-9} \text{ N}$$

$$\therefore \vec{F} = (-30\hat{i} + 32\hat{j} - 9\hat{k})$$