45. (a) Eq. 23-33 leads to $\tau = pE \sin 0^\circ = 0$.

(b) With $\theta = 90^\circ$, the equation gives

$$\tau = pE = \left(2(1.6 \times 10^{-19}\,\text{C})(0.78 \times 10^{-9}\,\text{m})\right)\left(3.4 \times 10^{6}\,\text{N/C}\right) = 8.5 \times 10^{-22}\ \text{N}\cdot\text{m}\ .$$

(c) Now the equation gives $\tau = pE \sin 180^\circ = 0$.