

Answers Exam 1 2019

$$1. \vec{F} = -\frac{1}{4\pi\epsilon_0} \frac{q_2 q_3 A}{(A^2 + H^2)^{3/2}} \vec{i}_x + \left[-\frac{1}{4\pi\epsilon_0} \frac{q_1 q_3}{(H+B)^2} - \frac{1}{4\pi\epsilon_0} \frac{q_2 q_3 H}{(A^2 + H^2)^{3/2}} \right] \vec{i}_y$$

$$2. E_x = \frac{1}{4\pi\epsilon_0} \frac{Q}{a} \left(\frac{1}{((s-a)^2 + T^2)^{1/2}} - \frac{1}{(s^2 + T^2)^{1/2}} \right)$$

$$E_y = -\frac{1}{4\pi\epsilon_0} \frac{Q}{aT} \left(\frac{s-a}{((s-a)^2 + T^2)^{1/2}} - \frac{s}{(s^2 + T^2)^{1/2}} \right)$$

$$3. a) V(c, d) - V(a, b) = - \left[\frac{\alpha(c^4 - a^4)}{4} + \frac{\beta}{2} (d^2 - b^2) \right]$$

$$b) V(3R, 0) - V(0, 0) = - \frac{2\alpha}{3R}$$

$$4. \frac{\alpha}{\beta} = - \frac{L}{2}$$