Answers

1.1

(a) $\dfrac{\lambda_L q x r}{2\varepsilon_0\left(r^2+x^2\right)^{\frac{2}{3}}}\hat{\mathbf{x}}$ (b) $\dfrac{(2\pi r\lambda_L)q}{4\pi\varepsilon_0 r^2}\hat{\mathbf{x}}=\dfrac{Qq}{4\pi\varepsilon_0 r^2}\hat{\mathbf{x}}$ (c) $\dfrac{\rho_A R^2}{4\varepsilon_0 x^2}\hat{\mathbf{x}}$

1.2

32 C

1.3

(a) $\dfrac{q}{4\pi r^2}\hat{\mathbf{r}}$ (b) $\dfrac{\rho_L}{2\pi r}\hat{\mathbf{r}}$ (c) $\dfrac{\rho_A R}{r}\hat{\mathbf{r}}$, 0 (d) $\dfrac{q}{2}\hat{\mathbf{r}}$ (e) $q\hat{\mathbf{r}}$

$\mathbf{E}=\dfrac{\mathbf{D}}{\varepsilon_0}$ in all cases

1.4

$\dfrac{qr}{4\pi\varepsilon_0 a^3}\hat{\mathbf{r}}$ $0<r<a$

$\dfrac{q}{4\pi\varepsilon_0 r^2}\hat{\mathbf{r}}$ $r\geq a$

1.5

(a) $\dfrac{-q}{4\pi b^2}$ (b) $\dfrac{\rho_A b^2}{\varepsilon_0 r^2}\hat{\mathbf{r}}$

1.6

(b) $8\pi a^3 K/15$

(b) $\dfrac{K_0 r}{3\varepsilon_0}\left(1-\dfrac{3r^2}{5a^2}\right)\hat{\mathbf{r}}$ $r<a$

$\dfrac{2K_0 a}{15\varepsilon_0}\hat{\mathbf{r}}$ $r=a$

$\dfrac{2K_0 a^3}{15\varepsilon_0 r^2}\hat{\mathbf{r}}$ $r>a$