1. From problem 14.8, we have shown that the radiated power can be expressed in terms of the force $\mathbf{F}$ acting on the charge

$$P = \frac{2}{3}\frac{z^2e^2}{m^2c^3}\gamma^2\left[F^2 - (\boldsymbol{\beta}\cdot\mathbf{F})^2\right] \tag{1}$$

For the charge moving inside electric and magnetic field, the force is

$$\mathbf{F} = ze\left(\mathbf{E} + \boldsymbol{\beta}\times\mathbf{B}\right) \tag{2}$$

giving

$$P = \frac{2}{3}\frac{z^4e^4}{m^2c^3}\gamma^2\left[(\mathbf{E} + \boldsymbol{\beta}\times\mathbf{B})^2 - (\boldsymbol{\beta}\cdot\mathbf{E})^2\right] \tag{3}$$

2. From the component form of $F^{\mu\nu}$ and $F_{\lambda\mu}$ (see 11.137, 11.238), it is straightforward to verify that for the 4-vector $p^\nu = \gamma mc\,(1, \boldsymbol{\beta})$, we have

$$F^{\mu\nu}p_\nu = \gamma mc\,(-\boldsymbol{\beta}\cdot\mathbf{E}, -\mathbf{E} - \boldsymbol{\beta}\times\mathbf{B}) \tag{4}$$
$$p^\lambda F_{\lambda\mu} = \gamma mc\,(\ \ \boldsymbol{\beta}\cdot\mathbf{E}, -\mathbf{E} - \boldsymbol{\beta}\times\mathbf{B}) \tag{5}$$

enabling us to write (3) as

$$P = \frac{2}{3}\frac{z^4e^4}{m^4c^5}\left(F^{\mu\nu}p_\nu p^\lambda F_{\lambda\mu}\right) = \frac{2}{3}\frac{z^4r_0^2}{m^2c}\left(F^{\mu\nu}p_\nu p^\lambda F_{\lambda\mu}\right) \qquad \text{where} \qquad r_0 = \frac{e^2}{mc^2} \tag{6}$$

Note: this covariant form of P is a direct substitution of the covariant equation of motion (12.3) into the Larmor formula (14.24).