Q- Find the mean radiation power of an electron performing harmonic oscillations with amplitude a = 0.10 nm and frequency f = 6.5 X 10^{14} s^{-1}

As no other data is given, we will consider the classical methods for the energy loss by the electron as critically damped harmonic oscillator. The force constant for the harmonic oscillator is related to angular frequency ω as

$$\omega = \sqrt{\frac{K}{m}}$$

And thus the force constant

$$K = m\omega^2$$

(m is the rest mass of electron)

The total energy of the oscillator is given by maximum potential energy with displacement equal to amplitude a

$$U = \frac{1}{2}Ka^2 = \frac{1}{2}m\omega^2a^2$$

As the electron losses all its potential energy in radiation during one time period the average radiant power is given by

$$P = \frac{U}{T} = \frac{1}{2}m\omega^2a^2 * \frac{\omega}{2\pi}$$

Or $$P = \frac{m\omega^3a^2}{4\pi}$$

Or $$P = \frac{9.11*10^{-31}*(6.5*10^{14})^3*(0.10*10^{-9})^2}{4*3.14} = 1.99 * 10^{-7}W$$