Result:

1. Infrared light with wavelength = 1.2 μm: $E_{quantum}$ = 1.7×10^{-19} J
2. Radio waves with frequency = 89.1 MHz: $E_{quantum}$ = 5.90×10^{-26} J
3. Green light with λ = 525 nm: $E_{quantum}$ = 3.78×10^{-19} J

Solution:

1. Calculate the wavelength in meters: $1.2\ \mu m = 1.2 * 10^{-6}\ m$

$$E_{quantum} = \frac{hc}{\lambda} = \frac{(6.626 * 10^{-34} J \cdot s)\left(2.9979 * 10^{8} \frac{m}{s}\right)}{1.2 * 10^{-6}\ m} = \frac{1.986 * 10^{-25}\ J \cdot m}{1.2 * 10^{-6}\ m}$$

$$= 1.7 * 10^{-19}\ J$$

2. Calculate the frequency in Hz: 89.1 MHz = 89.1×10^{6} Hz = 8.91×10^{7} Hz

$$E_{quantum} = h\nu = (6.626 * 10^{-34} J \cdot s)(8.91 * 10^{7}\ s^{-1}) = 5.90 * 10^{-26} J$$

3. Calculate the wavelength in meters: $525\ nm = 525 * 10^{-9}\ m$

$$E_{quantum} = \frac{hc}{\lambda} = \frac{(6.626 * 10^{-34} J \cdot s)\left(2.9979 * 10^{8} \frac{m}{s}\right)}{525 * 10^{-9}\ m} = \frac{1.986 * 10^{-25}\ J \cdot m}{525 * 10^{-9}\ m}$$

$$= 3.78 * 10^{-19}\ J$$