EE2190 Quiz 3, Spring 2004

Show your work for full credit. Express ALL answers in MKS (meters, kilograms, seconds).

1. Given that a particular FM radio station broadcasts at 97.7MHz with 100 kW of power, how many photons per second are emitted?

\[
\text{Power} = \frac{\text{Energy}}{\text{sec}} = \frac{n \cdot h \cdot v}{\text{sec}} = 100 \times 10^3 \text{ J/s}
\]

\[
\Rightarrow \frac{n}{\text{sec}} = \frac{10^5}{6.626 \times 10^{-34} \cdot 9.77 \times 10^8} = 1.5 \times 10^{30} / \text{sec}
\]

2. A 100W laser beam is absorbed on a screen for 10 seconds. What is the linear momentum transferred to the screen?

\[
P = \frac{E}{c} = \frac{100 \text{ J} \cdot 10 \text{ [sec]}}{3 \times 10^8 \text{ [m/s]}} = 3.3 \times 10^{-6} \frac{\text{kg} \cdot \text{m}}{\text{s}}
\]