CLASS EXERCISE #16 - BASTILLE DAY

(a) What is the direction of the magnetic field of the wave at that point at that time?

Using the right-hand rule with \( \vec{c} \) north and \( \vec{E} \) up, the magnetic field must be in the east direction.

(b) What is the wavelength of this wave?

\[
\lambda = \frac{c}{f} = \frac{(3.00 \times 10^8 \text{ m/s})}{(5.0 \times 10^{14} \text{ Hz})} = 0.60 \times 10^{-6} \text{ m}
\]

or 0.60 \( \mu \text{m} \) or \( 6.0 \times 10^{-7} \text{ m} \).

(c) Determine the period of this wave.

\[
T = \frac{1}{f} = \frac{1}{(5.0 \times 10^{14} \text{ Hz})} = 0.20 \times 10^{-14} \text{ s} = 2.0 \times 10^{-15} \text{ s}
\]

(d) How much time elapses between when the electric field is a maximum in the up ( \( \uparrow \) ) direction and the next time it is a maximum in the up ( \( \uparrow \) ) direction?

From a maximum in one direction to a maximum in the other direction is one period, or \( T = 2.0 \times 10^{-15} \text{ s} \).

(e) How much time elapses between when the magnetic field is a maximum in one direction and the next time it is a maximum in the opposite direction?

From a maximum in one direction to a maximum in the other direction is half a period, or \( T/2 = 1.0 \times 10^{-15} \text{ s} \).