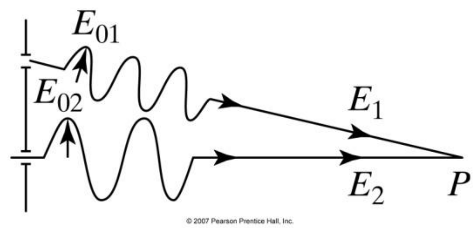
Homework 2

Due date: 6th of Jumad Alawal
Please solve all problems



Problem 1:

Two mutually coherent beams having parallel electric fields are described by:

$E_1 = 3\cos\left(ks_1 - \omega t + \frac{\pi}{5}\right)$

$E_2 = 4\cos\left(ks_2 - \omega t + \frac{\pi}{6}\right)$

With amplitudes in kV/m. The beams interfere at a point P where the phase difference due to path is $\pi/3$ (the first beam having the longer path). At the point of superposition, calculate:

(a) The irradiances I_1 and I_2 of the individual beams
(b) The irradiance I_{12} due to their interference
(c) The net irradiance
(d) The fringe visibility

Problem 2:

a. Show in a phasor diagram the following two harmonic waves:

$E_1 = 2\cos\omega t$ and $E_2 = 7\cos(\pi/4 - \omega t)$

b. Determine the mathematical expression for the resultant wave.

Problem 3:

Standing waves are produced by the superposition of the wave

$y = (7\ cm)\sin\left[2\pi\left(\frac{t}{T} - \frac{2x}{\pi\ cm}\right)\right]$

and its reflection in a medium whose absorption is negligible. For the resultant wave, find the amplitude, wavelength, length of one loop, velocity, and period.