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## QUESTIONS

1. Two waves on a string are given by the following functions:  $y_1(x, t) = 4 \cos(20t - 30x)$  and  $y_2(x, t) = -4 \cos(20t + 30x)$  where  $x$  is centimeters. The waves are said to interfere constructively when their superposition  $|y_s| = |y_1 + y_2|$  is a maximum and they interfere destructively when  $|y_s|$  is minimum.
  - a) What are the direction of propagation of waves  $y_1(x, t)$  and  $y_2(x, t)$ .
  - b) At  $t = (\pi/50)$  s, at what location  $x$  do the two waves interfere constructively, and what is the corresponding value of  $|y_s|$ ?
  - c) At  $t = (\pi/50)$  s, at what location  $x$  do the two waves interfere destructively, and what is the corresponding value of  $|y_s|$ ?
2. Express the following time-harmonic fields as phasors
  - a)  $\vec{A} = 3 \sin(2t + \pi/3) \vec{e}_x + 5 \cos(2t + \pi/6) \vec{e}_y$
  - b)  $\vec{B} = (1000/\rho) \sin(\omega t - 2\pi z) \vec{e}_\rho$
  - c)  $\vec{C} = (\cos(\theta)/r) \sin(\omega t - 4r) \vec{e}_\theta$
  - d)  $\vec{D} = 10 \cos(k_1 x) \cos(\omega t - k_2 z) \vec{e}_y$
3. Express the following phasors as time-harmonic fields
  - a)  $\tilde{A} = -5e^{j\pi/3}$
  - b)  $\tilde{B} = (6 + j8)$
  - c)  $\tilde{C} = -j$
  - d)  $\tilde{D} = 2e^{j\pi/6}$