Quiz #1 Ch16

Name: ID#: Sec#:

Q1 The displacement of a string carrying a traveling sinusoidal wave is given by:

$y (x,t)=y\_{m} sin (kx –ω t –φ)$. At time t= 0 the point at x = 0 has a displacement of 0 and is moving in the positive y direction. Find the phase constant φ.

$y\left(x,t\right)=y\_{m} sin(kx-wt-φ)$ …………….. (1)

$u\left(x,t\right)=\frac{∂y}{∂t}=-y\_{m}w cos(kx-wt-φ)$ ……………… (2)

Given At t = 0 and x = 0, y(0,0) = 0 and u(0,0) >0

From equation (1), $y\left(0,0\right)=y\_{m} sin\left(-φ\right)=-y\_{m} sin\left(φ\right)=0⟹either φ=0 or φ=π$

From equation (2) $u\left(x,t\right)=-y\_{m}w cos\left(-φ\right)=-y\_{m}w cos\left(φ\right)>0⟹φ=π$

$$since cos\left(0\right)=1 and cos\left(π\right)=-1 $$

$φ=π make u positive $ 

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You can also determine what is the correct choice by making a graph of y(x,0)

t=t

t=0

φ=0

y(x,0)

φ=π

u(0,0)

x