Q: A synchronous traveling wave with amplitude 2 (optional unit), wavelength 5 m and period 3 s moves in the negative z direction. At zero time, its displacement at the origin is zero. the corresponding wave function

    a) explicitly in terms of wavelength and period,
    b) explicitly in terms of diffusion and velocity constants, and
    c) Write in mixed form.

Sol:

    a)

$$\Psi = A\sin\big(k(z + vt)\big)$$

$$k = \frac{2\pi}{\lambda} = \frac{2\pi}{5}$$

$$\Psi = 2\sin\left(\frac{2\pi}{5}\left(z + \frac{\lambda}{T}t\right)\right) = 2\sin\left(2\pi\left(\frac{z}{5} + \frac{1}{3}t\right)\right)$$

    b)

$$\Psi = 2\sin\left(\frac{2\pi}{5}\left(z + \frac{\lambda}{T}t\right)\right) = 2\sin\left(\frac{2\pi}{5}\left(z + \frac{5}{3}t\right)\right)$$

    c)

$$\Psi = 2e^{i\frac{2\pi}{5}\left(z + \frac{5}{3}t\right)} = 2e^{i\left(\frac{2\pi}{5} + \frac{2\pi}{3}t\right)}$$