

Quiz 1

Sep. 16, 2020

Q1. Evaluate the following integral:

$$I_1 = \int_0^{2\pi} \cos^2\left(\frac{2\pi t}{T}\right) dt$$

Q2. Use the identity $\exp(ix) = \cos(x) + i\sin(x)$ to express E_1 in terms of A_1 and A_2 .

$$E_1 = (1 + 2i)e^{i\omega t} + (1 - 2i)e^{-i\omega t}$$

Q3. In the following differential equation, determine $x(t)$ such that $x(0) = 1$ and $\dot{x}(0) = \pi$.

$$\frac{\ddot{x}}{4} + x = 1$$

Q4. A heavy mass m is attached to a slider as shown in the figure below. The slider undergoes a harmonic motion with amplitude A and frequency ω . As a result of this motion, the mass swings harmonically about the vertical axis with amplitude B and frequency ω . The length of the rigid connecting rod is L . Determine the kinetic energy of the swinging mass.

