

MTH 256 Lesson 18 - Sinusoidal Forcing

1. Find the solution to the initial-value problem $\frac{d^2y}{dt^2} + 2\frac{dy}{dt} + 8y = 2\cos(3t)$, $y(0) = y'(0) = 0$.

2. Set up a differential equation modelling the charge on the capacitor of an RLC Circuit with an alternating current being pushed through it. Then deduce the differential equation modelling the current through the circuit.

3. Consider an RLC circuit with $R = 50$ ohms Ω , $L = 0.1$ henry (H), and $C = 5 \times 10^{-4}$ farad (F). At time $t = 0$, when both $I(0)$ and $Q(0)$ are zero, the switch in the circuit is closed and a 110-V, 60-Hz alternating current is allowed through the circuit via a current generator (any AC power outlet). Find the current in the circuit and the time lag of the steady periodic current behind the voltage.