My objective is to find the temperature profile. After deriving the energy balance:

$$\frac{d^2T}{dx^2} - \left(\underbrace{\frac{\alpha}{\delta\lambda}}_{\text{m}} + \underbrace{\frac{\alpha\epsilon}{\delta\lambda}}_{\text{n}} \; sin(kx) \right) \; T = \underbrace{-\left(\frac{\dot{\phi}'''}{\lambda} + \frac{\alpha T_\infty}{\delta\lambda} \right)}_{\text{q}} - \underbrace{\frac{\alpha T_\infty \epsilon}{\delta\lambda}}_{\text{p}} \; sin(kx)$$

m,n,q and p are constant. I have tried to solve the complementary/particular solution but it did not work. If the homogeneous solution would be much complicated then I wonder about the particular solution. One more question:

$$Homogeneous\ solution = C_1 e^{mx} + C_2 e^{-mx}$$

Is the above equation only apply when the all the coefficient are constant for the left hand side of inhomogeneous ODE?