

$$4) \frac{d^2x}{dt^2} + \frac{\omega^2}{a} x = \frac{b}{a} \sin \omega t \quad (4)$$

If $x e^{at/a}$

$$\frac{d}{dt} (x e^{at/a}) = \frac{b}{a} \sin \omega t e^{at/a}$$

$$x e^{at/a} = \int \frac{b}{a} \sin \omega t e^{at/a} dt$$

$$x e^{at/a} = -\frac{b}{\omega a} \cos \omega t + A$$

$$x = \left(-\frac{b}{\omega a} \cos \omega t + A \right) e^{-at/a}$$

As \rightarrow

$$x e^{at/a} = \int \frac{b}{a} \sin \omega t e^{at/a} dt$$

$$\begin{aligned} x e^{at/a} &= \frac{be^t}{a} \left(\frac{\frac{1}{a} \sin \omega t - \omega \cos \omega t}{\omega^2 + \frac{1}{a^2}} \right) + C \\ &= b e^{at/a} \frac{(\sin \omega t - \omega a \cos \omega t)}{\omega^2 a^2 + 1} + C \end{aligned}$$

$$x = \frac{b (\sin \omega t - \omega a \cos \omega t)}{\omega^2 a^2 + 1} + C e^{-at/a}$$

as $t \rightarrow \infty$ oscillatory.