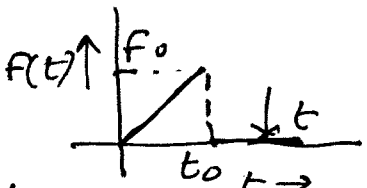
Corrections:- Replace the solution of part (ii) given earlier (there was a mistake) by the following:

(ii) For $t > t_0$



$$x(t) = \int_0^t F(\tau)\, g(t-\tau)\, d\tau$$

$$= \int_0^{t_0} F(\tau)\, g(t-\tau)\, d\tau + \int_{t_0}^{t} F(\tau)\, g(t-\tau)\, d\tau$$

$$= \frac{F_0}{t_0 m \omega_n^2}\left[\frac{1}{\omega_n} \tau \cos\omega_n(t-\tau)\Big|_0^{t_0} + \frac{1}{\omega_n^2} \sin\omega_n(t-\tau)\Big|_0^{t_0} \right]$$

$$= \frac{F_0}{k t_0}\left[t_0 \cos\omega_n(t-t_0) + \frac{1}{\omega_n}\left\{ \sin\omega_n(t-t_0) - \sin\omega_n t \right\} \right]$$

Check this result too

$$= \frac{F_0}{k}\left[\cos\omega_n(t-t_0) + \frac{1}{t_0\omega_n}\left\{ \sin\omega_n(t-t_0) - \sin\omega_n t \right\} \right]$$