HOME WORK 2 HINTS

1.

$$H_{fi}^{(1)} \quad = \quad \left\langle \phi_f \left| H^{(1)} \right| \phi_i \right\rangle$$

For allowed transitions $H_{fi}^{(1)} \neq 0$. Therefore, we have $f = i - 2$ or $i + 2$.

$$P_{fi} = \frac{4 \left| H_{fi}^{(1)} \right|^2}{\hbar^2 \omega_{fi}^2} \sin^2(\omega_{fi} T/2)$$

3.

$$a_f^{(2)} = \frac{1}{(\mathrm{i}\hbar)^2} \sum_n \int_{-\infty}^{t} \mathrm{d}t' \int_{-\infty}^{t'} \mathrm{d}t'' \mathrm{e}^{\mathrm{i}\omega_{fn} t''} H_{fn}(t'') \, \mathrm{e}^{\mathrm{i}\omega_{ni} t'} H_{ni}(t')$$

$$\psi = \sum_f a_f(t) \mathrm{e}^{-\mathrm{i}E_f t/\hbar} \phi_f^{(0)} \ ,$$