

### Time-Dependent Perturbation Theory – Problem 3

Consider a symmetric two-level system described by the usual Hamiltonian,

$$\hat{H} = -\hbar\Omega(|R\rangle\langle L| + |L\rangle\langle R|)$$

whose eigenstates are separated by the tunneling splitting  $2\hbar\Omega$ . The system is in its ground state. Suppose at  $t = 0$  the TLS begins to interact with an external field, which changes the Hamiltonian by the term

$$\hat{V} = \mathcal{E}(|R\rangle\langle R| - |L\rangle\langle L|).$$

Use first order perturbation theory to calculate the probability of finding the TLS in the excited state, as a function of time.