CL15_Q1. What is a quantum mechanical tunnelling? Explain its significance.

CL15_Q2. Discuss the wave function of a particle with energy E incident on a potrential barrier of height $V_0 > E$ between $x = 0\ to\ x = L$ and $V = 0$ for all other values of x. Elaborate on the sensitivity of the tunneling probability to the width of the barrier.

CL15_Q3. A proton of energy 3 MeV is incident on a potential barrier of height 10 MeV and thickness 10^{-14} m. Estimate the transmission coefficient for the proton .

CL15_Q4. A particle is incident on a potential barrier of width a, with total energy less than the barrier height, and it is reflected. Does the reflection involve only the potential discontinuity facing its direction of incidence? If the other discontinuity were moved by increasing a, is the reflection coefficient changed? What if the other discontinuity were removed, so that the barrier was changed into a step?