CL16_Q1. Discuss quantum mechanical tunnel effect to explain the emission of alpha particles from a radioactive nucleus.

CL16_Q2. Why is alpha decay a classically forbidden phenomenon and how the phenomenon is well explained using the laws of quantum mechanics.

CL16_Q3. A proton and an alpha particle with the same energy E approach a potential barrier whose height is $V_o > E$. Do they have the same probabilities of getting through? If not which has greater probability and why?

CL16_Q4. A simple model of a radioactive nuclear decay assumes that α-particles are trapped inside a well of nuclear potential that walls are the barriers of a finite width 2.0 fm and height 30.0 MeV. Find the tunneling probability across the potential barrier of the wall for α-particles having kinetic energy (a) 29.0 MeV and (b) 20.0 MeV.

CL16_Q5. The quantum mechanical transmission coefficient of an alpha particle through a nuclear potential barrier is 2.54×10^{-24}. Taking the velocity of the alpha particle and the nuclear radius as 1.7×10^7 m/s and 10^{-14} m, respectivetly, calculate the mean lifetime of alpha decay.