

M08Q.1 - Delta Function Potential

Problem

A particle of mass m is confined to a one dimensional space with potential

$$V(x) = -V_0[\delta(x + a) + \delta(x - a)].$$

- a) Write the general form of a bound state solution. Find the boundary condition at $x = \pm a$.

Based on the symmetry of the problem, the solutions can be classified by their properties under the parity transformation $x \rightarrow -x$.

- b) For even parity solutions, $\psi(-x) = \psi(x)$, show that there is always one (and only one) bound state solution.
- c) For odd parity solutions, $\psi(-x) = -\psi(x)$, determine the condition under which there is a bound state solution.