

PHYH-C IX: ELEMENTS OF MODERN PHYSICS

Assignment -II

Due date: On or before 22 March, 2019

Answer all the questions

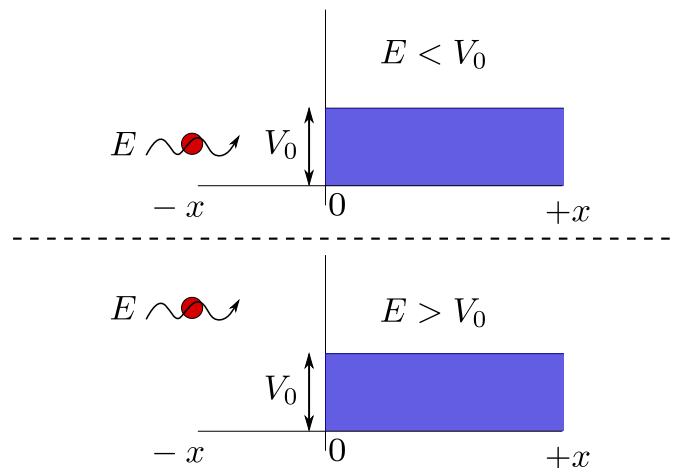
1. A particle in the infinite square well of walls at $x = 0$ and $x = a$ has initial wave function (i.e., ground state !)

$$\Psi(x, 0) = Ax(a - x).$$

- (a) Normalize $\Psi(x, 0)$. (b) Plot $\Psi(x, 0)$ as a function of x .

Marks: 10+5

2. Consider a particle of mass m is incident on a step potential defined as



$$V(x) = \begin{cases} V_0 & \text{for } x \geq 0 \\ 0 & \text{for } x < 0 \end{cases}$$

- (a) For $E < V_0$
- Find the transmission coefficient (T) and reflection coefficient (R).
 - Find the value of $R + T$
- (b) For $E > V_0$
- Find the physically acceptable wave functions in both regions at $x < 0$ and $x > 0$.

Marks: (10+5)+(10)