Consider a Quantum Particle trapped in a Finite Potential Well whose

potential profile is given below.



The wave-function ѱ(x) of the particle with energy E follows the following time independent

Schrodinger Equation guided by some boundary conditions given below.

Boundary conditions-

Where, (x) is the wave-function in the Region-I and so on. The prime denoted the first

derivative w.r.t the position, x. Assume, m = 9.11\*10-31 kg, = 1.0546\*10-34 Js, L = 8 nm

and V0 = 5.5 eV. Using Finite Difference Method (FDM) in Python, determine the followings.

1. An array containing all the allowed values of energy levels E within the well. From this

result, mention the value of the ground energy (min E) and valence energy (max E). Show

the energy levels in the same plot as the potential V (x).

2. Generate the wave-functions (normalized) corresponding to each energy level and plot at

least three wave-functions including the ground state. Take as the plot

window. Also, you can take the FDM mesh size as per your convenience.

3. Also, elaborately discuss how you have modeled the ordinary differential equation in FDM

scheme and mention the corresponding FDM matrix you have built to solve this problem

prior to the python code.