VIT
Vellore Institute of Technology

School of Electronics Engineering
Fall Semester (2018-19), CAT-I
Introduction to Nanoscience and Nanotechnology

Course Code : ECE1006 **Slot:** D1

Max. Marks : 50 **Class Nbr.:** 3469, 3471

Duration : 90 Minutes **Date** : 16/08/18

Faculty : Prof. Muthu Raja S and Prof. Raja Sellappan

Answer ALL the questions

1. What is de-Broglie hypothesis? Show that $\lambda = h/P$. Compute the de-Broglie wavelength of 12 KeV neutron. Mass of one neutron may be taken as 1.67×10^{-27} Kg. [10]

2. Explain in detail any three size dependent nanomaterial properties. [15]

3.a) Consider an electron trapped in a 1D deep potential well. Derive the expressions of the quantized energy states of the electron by solving Schrodinger's equation. [10+5=

3.b) Estimate the energy level for an electron trapped in deep potential well of 2Å width and 2 cm width for n=2 and n=3. Compare the differences and motivate your answer. Assume $h = 6.626 \times 10^{-34}$ m^2 kg/s

4. Classify three different particles and their distribution functions. Describe the particle speed in idealized gases where the particles move freely inside a stationary container without interacting with one another at room temperature, lower and higher temperature. Identify the distribution function and plot them for the above three different temperatures. [10]