



*Arab Academy for Science & Technology & Maritime Transport
(AASTMT – Cairo Branch)
College of Engineering & technology
Electronics & Communication Engineering Department*

Course : Solid State Electronics
Course Code : EC210

Sheet #4

TextBook

'Principles of Electronic Materials and Devices', Third Edition, S.O. Kasap © McGraw-Hill, 2006

Constants:

$$\epsilon_0 = 8.85 \times 10^{-12} \text{ Fm}^{-1}$$

$$\text{Charge of electron (q)} = 1.6 \times 10^{-19} \text{ C}$$

$$\text{Mass of electron (m}_e) = 9.1 \times 10^{-31} \text{ kg}$$

$$\text{Plank's Constant (h)} = 6.63 \times 10^{-34} \text{ Js}$$

Solve the following problems

[1] Example 3.3 p.201.

[2] Use the De-Broglie relation to compute the wavelength of:

- A 46gram golf ball with a velocity of ms^{-1} .
- An electron with a velocity of 10^7ms^{-1} .

[3] Example 3.6 p.211.

[4] Which of the following wave functions cannot be solutions of Schrodinger's eq. for values of x ? Why not?

- $\psi(x) = A \tan(x)$
- $\psi(x) = e^{x^2}$
- $\psi(x) = e^{-x^2}$

[5] A particle has a wave function:

$$\psi(x) = A \sin(kx) \quad \text{for } 0 < x < L$$

- Find the probability density function.
- Find the value of A.
- Find the probability that the particle will be found in the region between $-L/4$ to $L/2$.