



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

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

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

- a.  $\psi(x) = A \tan(x)$
- b.  $\psi(x) = e^{x^2}$
- c.  $\psi(x) = e^{-x^2}$

[3] A particle has a wave function:

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

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