Fundamentals of Nanoelectronics, Basic Concepts Unit 3

Prof. Supriyo Datta

L3.8 Quiz

Answers

3.8. Boltzmann Equation

3.8a For the equation $\frac{\partial f}{\partial t} + v_z \frac{\partial f}{\partial z} + F_z \frac{\partial f}{\partial p_z} = S_{op} f(z, p_z, t)$ which of the following statements is true?

(a) Left hand side is equivalent to Newton's law

(b) Right hand side is equivalent to Newton's law

(c) Left hand side represents scattering processes

(d) Left and right hand sides together are equivalent to Newton's law

(e) none of the above

3.8b Consider the equations

$$I = -\frac{G_B}{q}\frac{d\tilde{m}}{dz} \quad \textbf{(A)}$$

$$I = -\frac{G_B}{q}\frac{d\tilde{m}}{dz} \quad \textbf{(B)}$$

$$I = -\frac{G_B}{q}\frac{dm}{dz} \quad \textbf{(C)}$$

(a) (A) and (B) are generally true, but (C) is only valid for ballistic transport

(b) (A) and (B) are generally true, but (C) is only valid for diffusive transport

(c) (A), (B) and (C) are only valid for diffusive transport

(d) (A), (B) and (C) are all generally correct

(e) (A), (B) and (C) are only valid for ballistic transport