Fundamentals of Nanotransistors

L4.3 Quiz

ANSWERS

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Lecture 4.3: MFP and Diffusion Coefficient

1) What is $D_n/m_n = k_BT/q$ called?

a) Mathiessen's Rule.
b) The Weidemann-Franz Law.
c) The Kelvin relation.
d) The Einstein relation.
e) The Caughey-Thomas relation.

2) For a thermal equilibrium flux and nondegenerate conditions, what is the relation between diffusion coefficient and mean-free-path, l_0?

a) $D_n = u_T l_0/2$**.**
b) $D_n = u_T l_0/3$.
c) $D_n = 3/(u_T l_0)$.
d) $D_n = \sqrt{u_T l_0/3}$.
e) $D_n = (u_T l_0)^2/3$.

3) When is Fick's Law of diffusion, $\text{electron flux} = -D_n\, dn/dx$, valid?

a) For regions that are many mfps long.
b) For regions that are much shorter than a mfp.
c) For regions that are long, short, or comparable in length to the mfp.
d) Only for long regions under strongly degenerate conditions.
e) None of the above.