Week 13 Lecture 33 Quiz:
Balance Equations: III

ECE 656: Electronic Conduction In Semiconductors

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Student's name: _____

Answer the **multiple choice questions** below by choosing the **one, best answer**. Then **ask a question** about the lecture.

1) When we write a drift-diffusion equation in the form, $J_{nj} = nq\mu_n \mathcal{E}_j + \frac{2}{3}\mu_n \frac{\partial W}{\partial x_j}$, what assumption are we making?

   a) Non-degenerate carrier statistics.
   b) The temperature does not vary with position.
   c) The electron temperature is equal to the lattice temperature.
   d) The kinetic energy is equally distributed between the three degrees of freedom .
   e) Only that the BTE is valid.

2) When we write the velocity as $\upsilon_x = \upsilon_{dx} + c_x$ what is the quantity, c_x ?

   a) The average velocity.
   b) The rms thermal velocity.
   c) The uni-directional thermal velocity.
   d) The peculiar velocity.
   e) The Richardson velocity.

3) The quantity, $nm^* \langle c^2 c_x \rangle / 2$ is commonly called what?

   a) The kinetic energy density.
   b) The kinetic energy flux.
   c) The heat.
   d) The heat flux.
   e) The electron temperature.

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4) To close the balance equations, we need to approximate which of the three terms in the energy flux, $F_{Wx} = W\upsilon_{dx} + nk_B T_e \upsilon_{dx} + Q_x$?

   a) $W\upsilon_{dx}$
   b) $nk_B T_e \upsilon_{dx}$.
   c) Q_x .
   d) a) and b) above.
   e) b) and c) above.

5) Which of the following statements is true about a displaced Maxwellian distribution?

   a) The kinetic energy flux is zero.
   b) The total energy flux is zero.
   c) The heat flux is zero.
   d) The particle flux is zero.
   e) None of the above.

6) What question do you have about this lecture?

Turn in to Prof. Lundstrom in class on Friday, Nov. 15.