*Fundamentals of Nanoelectronics, Basic Concepts Unit 4*

Prof. Supriyo Datta

L4.6 Quiz

Answers

**4.6. Entropy**

**4.6a** Consider contacts 1 and 2 held at two different temperatures $T_1 > T_2$. If an energy $\Delta E$ is transferred from 1 to 2, the overall increase in entropy is

(a) $\Delta E\left(\frac{1}{T_1}+\frac{1}{T_2}\right)$

(b) $\Delta E\left(\frac{1}{T_1}-\frac{1}{T_2}\right)$

(c) $\Delta E\left(\frac{1}{T_2}-\frac{1}{T_1}\right)$

(d) $\frac{\Delta E}{T_1 - T_2}$

(e) None of the above

**4.6b** The entropy S is related to the number of microscopic states W by $S = k\,\ell n W$. If the contacts consist of N electrons freely moving in d dimensions, the quantity W is given by

(a) $W \sim E^{(d/2)-1}$

(b) $W \sim E^{(Nd/2)-1}$

(c) $W \sim E^{(d/2)+1}$

(d) $W \sim E^{Nd-1}$

(e) None of the above