

3B5 Semiconductor Engineering
2003 Exam Numerical Solutions

1 (b)
$$E = \frac{\hbar}{2} \left(\frac{c}{m} \right)^{1/2}$$

2 (d)
$$\langle E \rangle = 1.89 \text{ eV}$$
$$\lambda = 8.92 \times 10^{-10} \text{ m}$$

3 (b) (i) $N_A = 1 \times 10^{24} \text{ m}^{-3}$
(ii) $E_F - E_C = -0.10 \text{ eV}$
(c) $w = 50 \text{ nm}$

5 (b) (i) Barrier_{Si→m} = 0.48 eV
(ii) Barrier_{m→Si} = 0.65 eV
(iii) $I = 53.7 \text{ nA}$

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May 2003