Week 5: Assignment 5

The due date for submitting this assignment has passed.

Due on 2021-09-29, 23:59 IST.

As per our records you have not submitted this assignment.

The Fermi enrgy of copper is 7 eV. (use h = 6.6 $\times 10^{-34} JHz^{-1}$, 1eV = $1.602 \times 10^{-19} J$, $m_e = 9.1 \times 10^{-31}$ kg)

1) The Fermi momentum of electron in copper is _____ ***2 points***

- 16.48×10^{-25} kg m/s
- 13.38×10^{-25} kg m/s
- 12.48×10^{-25} kg m/s
- 14.28×10^{-25} kg m/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
14.28×10^{-25} *kg m/s*

2) The de Broglie wavelength of the electron is _____ ***2 points***

- 3.84×10^{-10} m
- 3.64×10^{-10} m
- 4.64×10^{-10} m
- 4.84×10^{-10} m

No, the answer is incorrect.
Score: 0

Accepted Answers:
4.64×10^{-10} *m*

3) The Fermi velocity is _____ ***2 points***

- 2.32×10^{6} m/s
- 1.57×10^{6} m/s
- 4.57×10^{6} m/s
- 3.37×10^{6} m/s

No, the answer is incorrect.
Score: 0

Accepted Answers:
1.57×10^{6} *m/s*

4) If electrons are treated as distinguishable particles, at what temperature would they have an average energy of 5.5 eV? (use $k_B = 1.3806 \times 10^{-23}$ J/K) ***2 points***

- 8.88×10^{4} K
- 6.38×10^{4} K
- 6.88×10^{4} K
- 8.38×10^{4} K

No, the answer is incorrect.
Score: 0

Accepted Answers:
6.38 $\times 10^{4}$ *K*

5) For a simple square lattice, the kinetic energy of a free electron at a corner of the first zone is higher than that of an electron at the mid point of a side face of zone by a factor of _____ ***2 points***

- 2
- 4
- 6
- 1

No, the answer is incorrect.
Score: 0

Accepted Answers:
2

6) The fcc lattice has 12 neighbours at a (0, ± 1, ± 1), a(± 1, 0, ± 1), a (± 1, ± 1, 0). Using the tight binding approximation, the energy band constructed from an atomic s-state can be given by ***2 points***

- E(k) = $E_0 - \alpha - 4\beta(\cos k_y a \cos k_z a + \cos k_z a \cos k_x a + \cos k_x a \cos k_y a)$
- E(k) = $E_0 - \alpha - 8\beta(\cos k_y a \cos k_z a + \cos k_z a \cos k_x a + \cos k_x a \cos k_y a)$
- E(k) = $E_0 - \alpha - 4\beta \cos k_x a \cos k_y a \cos k_z a$
- E(k) = $E_0 - \alpha - 8\beta \cos k_x a \cos k_y a \cos k_z a$

No, the answer is incorrect.
Score: 0

Accepted Answers:
E(k) = $E_0 - \alpha - 4\beta(\cos k_y a \cos k_z a + \cos k_z a \cos k_x a + \cos k_x a \cos k_y a)$