



Menoufia University - Faculty of Engineering - Physics dep.
Jun 2018 - Final Exam in Solid State Physics - Time : 3 hours

Answer the following questions:

- Q1: a) What types of crystallized solids?
b) Explain with details Bravais lattices and the seven crystal systems ?

Q2:a) The position energy $V(x)$ of two atoms in a binary part varies with the distance(x) between them according to the equation

$$V(x) = \frac{a}{x^{12}} + \frac{b}{x^6}$$

Find1) the value x at $V_x=0$

- 2) What is the value of x when the lowest energy?
- 3) The force between the atoms?
- 4) What is the decomposition (التحلل) energy of part?

- b) Find the electronic gas pressure at zero absolute - note that $E_F = 5\text{eV}$ and its the electronic density is 10^{23} for cm^2 .

Q3: a) Write notes on :

Electronic theory of metals – Hall effect– The drift mobility -
- electric current density- Wiedemann – Franz law

- b) In the quantum electron gas theory , prove that the potential energy for electron is given by

$$E_n = \frac{h^2}{8mL^2} * n^2$$

Find the electronic gas pressure at zero absolute - note that $E_F = 5\text{eV}$ and its the electronic density is 10^{23} for cm^2 .

Q4: a) Establish Richardson – Dushman law ?

- b) Using Fermi – Dirac statistics – find the largest thermodynamic potential of various macronomic states was found in a group of 4 phase points in two chambers each with 4 chambers?

----- GOOD LUCK ----- Dr. Mohamed Aboelez-----