Kurdistan Regional Government Iraq
Ministry of Higher Education & Scientific Research
Salahaddin University –Erbil
College of Basic Education
Department : General Science

Subject : Solid state physics
Stage : fourth for Eve
Round: first trail
Time : 3 hours

Final Exams
2016-2017

Note draw diagram and write equation where necessary

Q1: Explain the probability of electron distribution of all cases of energy with respect of temperature. 15 Marks

Q2 A- Complete the following statements.

1- In the fermion and bosons the wave function which describes a collection a particle must be -----and--- and have spin ---- and ---- respectively.
2- Energy gap called ---------- . 10 Marks
3- Fermi energy represent---------- .
4- The law for determine the Radius of body centered cubic is ----------.
5- Energy of one electron in the third orbit of the fixed element is $-21.25\ eV$, the atomic number is -----

B- Compare between cubic and orthorhombic crystal structure. 5 Mark

Q3- A- Chose the correct answer

1- Conduction in insulator by [A- electron B- hole C- both D- None of them]
2- Materials have short range order is [A- Liquid B-Amorphous C- crystalline D-Lattice]
3- Atoms can be in difference kinds is [A- Nane Bravais lattice Bravais lattice C- Primitive cell D- None primitive cell]
4- Electron translation from lower energy level to higher energy level when [A- Absorbed energy B-Emission energy C- reflected energy D- transmission energy]
5- The crystal have these properties $a = b = c \ and \ \alpha \neq \beta \neq \gamma \ si \ called$
[A- Triclinic B- Monoclinic C-Orthorhombic D- Tetragonal] 5 Marks

B - Describe Hexagonal close-packed crystals and the determine atomic packing factor of Hexagonal. 10 Marks

Q4- A- The volume of orthorhombic 90 nm cubes and a lattice parameter twice greater than the b lattice parameter and c lattice 5 nm determine the distance between planes 15 Marks

B- Explain difference between Electron and photon.

Best wishes

Lecture/instructor: Dr Abbas H Rostam
Signature
Date /29/5/2017

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Q1 A- Explain N type semiconductor. . 15 degree
B-- Compare between Fermion and Bosons

Q2: Complete the following statement.

1- The number of atom in the body centered cubic is -----
2- Density of quantum state in the Valance band as a function of ----------.
3- effective density of quantum state in the conduction band as a function of ----------
.
4- In Trivalent impurity called -----add to intrinsic semiconductor formed -----type majority carrier ------.

Q3 4- In silicon electron and hole effective mass are $(2.8 \times 10^{19}\ cm^{-3}\ and\ 1.04 \times 10^{19}\ cm^{-3})$ respectively and energy gap $1.12\ eV$ at room temperature determine 1- intrinsic carrier concentration 2-intrins fermi position at room temperature and at 150 kelvin

Q4- 1- Explain why insulator cannot allowed to flowing current. 3 Marks
2- Calculate atomic packing factor in face centered cubic. 5 Marks
3- In the simple cubic system with plane intercept $(\bar{2}, 1, \bar{3})$ and distance between planes 2 A^0
1-Draw the plane system 2- calculate the radius 3- volume of unit cell. 5 Marks
4- Drive the intrinsic fermi position in semiconductor. 5 Marks

Best wishes

Lecture/instructor: Dr Abbas H Rostam
Signature
Date: 2015-2016

General science four stage

Examination Solid state physics 11-5-2017

Q1 Complete the following statements

1- In the fermion and bosons the wave function which describes a collection a particle must be -----and --- and have spin ---- and ---- respectively.
2- Conduction of semiconductor by---------- in---------- respectively.
3- The valance and conduction bands in semiconductor are called ---------- .
4- The conductivity of intrinsic semiconductors is strongly dependent on ------- .
5- For temperatures above absolute zero, there is ---------- probability that some energy states above $\boldsymbol{E_F}$ will be ---------- by electrons and some energy states below $\boldsymbol{E_F}$ will be ----------.
6- Conductivity and resistivity ---------- decrease with decreasing ------ respectively.
7- Pauli exclusion principle is ---------.
8- The temperature -------- equivalent of $0.0777\ eV$ thermal energy. 25 Marks
9- If $f(E) = 0$ is mean ---------- .
10- Distribution of particle among energy level dependent on ---------- .

Q2 A- Calculate the temperature at which there is a 10^{-5} probability that an energy state 0.45 eV above the Fermi energy level is occupied by an electron. 15 Marks

Best wishes **instructor: Dr Abbas H Rostam**

Signature

General science four stage

Examination Solid state physics 11-5-2017

Q1 Complete the following statements

11- In the fermion and bosons the wave function which describes a collection a particle must be -----and --- and have spin ---- and ---- respectively.
12- Conduction of semiconductor by---------- in---------- respectively.
13- The valance and conduction bands in semiconductor are called ---------- .
14- The conductivity of intrinsic semiconductors is strongly dependent on ------- .
15- For temperatures above absolute zero, there is ---------- probability that some energy states above $\boldsymbol{E_F}$ will be ---------- by electrons and some energy states below $\boldsymbol{E_F}$ will be ----------.
16- Conductivity and resistivity ---------- decrease with decreasing ------ respectively.
17- Pauli exclusion principle is ---------.
18- The temperature -------- equivalent of $0.0777\ eV$ thermal energy. 25 Marks
19- If $f(E) = 0$ is mean ---------- .
20- Distribution of particle among energy level dependent on ---------- .

Q2 A- Calculate the temperature at which there is a 10^{-5} probability that an energy state 0.45 eV above the Fermi energy level is occupied by an electron. 15 Marks

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Signature