Ministry of Higher Education & Scientific Research
University of Technology
Communication Eng. Department
2nd Semester - Final Examination (2016/2017)

Subject: **Physics of Materials** Date: / / **2017**
Division: **optical communication systems** Time: **3 Hrs.**
Year: **First** Examiner:Nadia Ismael

Attempt **four** questions only

Q1: answer the following with true or false. (15 mark)

1) Dielectric is an insulator that can not be polarized.
2) The cooking chamber of the microwave oven is a Faraday cage.
3) Permanent polarization is due to the asymmetric location of positive and negative charges.
4) Superconductivity may occure at any temperature.
5) Classification of superconductors is done by magnetic field behavior.
6) Copper, silver and gold are three of the best metallic superconductors.
7) Free electron flow without applied voltage is made through slowing down molecular activity.
8) Superconductors involve power loss.
9) Microwaves are divided into sub-bands based on their wavelengths.
10) High energy of the microwave rotates the polar molecules of water.
11) In non magnetic materials neighboring atoms do align.
12) At low temperature extrinsic semiconductors have larger conductivity than intrinsic semiconductors.
13) A polymer is composed of many repeated subnits.
14) Porcelains are not glasses.
15) A crystalline is a material whose constituents are arranged in an ordered structure.

Q2: a- Define the following: polarizer, promotion, microwave rays, electrical breakdown, polymer. (10 mark)

b- what is the fluoride? (5 marks)

Q3: a- what are the differences between intrinsic and extrinsic semiconductors. (8 marks)

b-what are the models used for description of light? (7 marks)

Q4. Answer the following: (15 mark)

1) What is the electrical resistivity of materials.
2) Give a way to make an electromagnet.
3) What are the types of polarization that can be made by an electric field.
4) What is the ferroelectric material.
5) What is the optical waveguide?

Q5: a-calculate the conductivity of a piece of germanium containing $3*10^{22}$donors and $8*10^{21}$ acceptors per cubic metre. The electron mobility in Ge is 0.39. (8 mark)

b-Explain the electron mobility. (7 marks)