



Ministry of Higher Education & Scientific Research

University of Technology

Communication Eng. Department

2nd Semester - Final Examination (2016/2017)

Subject: Physics of Microwave Materials
Division: wireless communication systems
Year: First

Date: / / 2017

Time: 3 Hrs.

Examiner: Nadia Ismael

05 JUN 2017

DEPARTMENT OF
COMMUNICATION ENGINEERING
UNIVERSITY OF TECHNOLOGY



Attempt **four** questions only

Q1: answer the following with true or false.

- 1) Conduction in metals is done by electrons in the conduction band.
- 2) Conduction in insulators is done by electrons in the conduction band and holes in the valence band.
- 3) Silver has a little resistivity between materials.
- 4) When mechanical strength is important copper is preferred.
- 5) Very high electric fields can not free electrons from atoms.
- 6) Ferroelectric material exhibit permanent polarization in the absence of an electric field.
- 7) Ferroelectric materials are composed of crystals in which the structural units are tiny electric dipoles.
- 8) Permanent polarization is due to the asymmetric location of positive and negative charges.
- 9) Superconductivity may occur at any temperature.
- 10) High energy of the microwave does not rotate 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) Unsubstituted lithium ferrite has the lowest curie temperature among ferromagnetics.
- 14) Garnets species differ in chemical composition.
- 15) lithium ferrite has a dielectric constant in the range 14 to 20.

(15 mark)

Q2: a- Define the following: dielectric heating, magnetic bubble, relaxation time, electrical breakdown, lithium ferrite. (10 mark)

b- what are the properties of garnets? (5 marks)

Q3: a- what are the differences between electronic and ionic conduction. (7 marks)

b- what are the types of magnetic materials? (8 marks)

Q4. Answer the following: (15 mark)

- 1) What is the electrical resistivity of materials.
- 2) What is the dielectric loss?
- 3) what are the disadvantages of using microwaves?
- 4) What are the electrical characteristics of commercial alloys?

Q5: a-calculate the drift velocity of electrons in silicon at room temperature and when magnitude of the electric field is 500V/m? the mobility of electrons is 0.14 m²/V.s at room temperature. (12 mark)

b-Define the drift velocity. (3 marks)