

DiplETE – ET

Time: 3 Hours

DECEMBER 2012

Max. Marks: 100

PLEASE WRITE YOUR ROLL NO. AT THE SPACE PROVIDED ON EACH PAGE IMMEDIATELY AFTER RECEIVING THE QUESTION PAPER.

NOTE: There are 9 Questions in all.

- Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else.
- The answer sheet for the Q.1 will be collected by the invigilator after 45 minutes of the commencement of the examination.
- Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks.
- Any required data not explicitly given, may be suitably assumed and stated.

Q.1 Choose the correct or the best alternative in the following: (2×10)

a. If a piece of metal is made to have a temperature gradient between its two ends, an e.m.f. is observed to exist between those ends. The above phenomenon is known as

- (A) Thomson effect (B) Seebeck effect
(C) Peltier effect (D) Kelvin effect

b. Dielectric Losses due to polarization occurs in

- (A) Bipolar dielectrics (B) Non Metallic dielectrics
(C) Liquid Dielectric (D) All of these

c. The dielectric strength of ferroelectric materials depends to a large extent on

- (A) Intensity of Electric field
(B) Presence of magnetic material in the vicinity
(C) Area of hysteresis loop for the material
(D) Frequency of Applied Voltage

d. In ferromagnetic materials

- (A) The atomic magnetic moments are antiparallel and unequal
(B) The atomic magnetic moments are parallel
(C) The constituent is iron only
(D) One of the constituent is iron

e. Germanium has

- (A) Ionic Bond (B) Covalent bond
(C) Metallic Bond (D) Molecular bond

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- f. In P-N Junction, the region containing the uncompensated acceptor and donor ions is called
- (A) Transition Zone (B) Depletion Region
(C) Neutral Region (D) Active Region
- g. Which of the following diode is designed to operate in the breakdown region?
- (A) Signal Diode (B) Power Diode
(C) Zener Diode (D) None of these
- h. Non Linear resistors
- (A) result in non uniform heating
(B) follow ohms law at low temperatures only
(C) produce harmonic distortion
(D) None of these
- i. A Junction Field Effect Transistor can operate in
- (A) depletion mode only
(B) enhancement mode only
(C) depletion and enhancement modes
(D) neither depletion nor enhancement modes
- j. Material having a high dielectric constant, which is non linear are known as
- (A) ferroelectric material (B) elastomers
(C) super dielectric (D) hard dielectric

**Answer any FIVE Questions out of EIGHT Questions.
Each question carries 16 marks.**

- Q.2** a. Name and explain the factors on which resistivity of a conducting material depends. (8)
- b. Explain temperature dependence of electrical resistivity and conductivity in conductors and semiconductors. (8)
- Q.3** a. Explain the effect of a dielectric on the behaviour of a capacitor. (8)
- b. Explain the ionic and orientational polarization. (8)
- Q.4** a. Explain the terms dielectric losses and dielectric constant. (8)
- b. What are the important requirements of a good insulating material? (8)

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- Q.5** a. Differentiate between diamagnetic, paramagnetic and ferromagnetic materials. Also give one example of each. (8)
- b. Draw B-H curve for magnetic materials used in electric machines and explain hysteresis loop. (8)
- Q.6** a. Classify the materials based on the energy band and explain them. (8)
- b. Explain the term mobility, doping, diffusion, ferroelectricity. (8)
- Q.7** a. What is a PN junction? Draw and explain V-I Characteristics of a PN junction diode. (8)
- b. Give the application and properties of silicon iron alloy and nickel iron alloy. (8)
- Q.8** a. What is the function of a relay? How they can be classified in different categories? Explain in brief. (8)
- b. What is Metal Oxide film resistor? (8)
- Q.9** a. Describe diffused junction technique of fabrication in brief. (8)
- b. Give general properties of Junction Field Effect Transistor (JFET). (8)