ROLL NO. _____

Code: DE104 **Subject: ELECTRONIC ENGINEERING MATERIALS**

DipIETE – ET *{NEW SCHEME}*

Time: 3 Hours **JUNE 2014** **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. Resistivity of metals is expressed in terms of

(A) μ ohm **(B)** μ ohm/cm
(C) μ ohm-cm **(D)** μ ohm-cm/ºC

b. Materials having a high dielectric constant, which is non-linear, are known as

(A) ferroelectric materials **(B)** elastomers
(C) super-dielectrics **(D)** hard dielectrics

c. Materials which lack permanent magnetic dipoles are called

(A) diamagnetic **(B)** ferromagnetic
(C) semi-magnetic **(D)** none of these

d. Silicon doped with phosphorous is a

(A) intrinsic semi-conductor **(B)** extrinsic semi-conductor
(C) p-type semi-conductor **(D)** n-type semi-conductor

e. Pure silicon at 0 K is an

(A) Intrinsic semiconductor **(B)** Extrinsic semiconductor
(C) Metal **(D)** Insulator

f. Which of the following is the permanent magnet material?

(A) Cobalt steel **(B)** Silicon iron
(C) Nickel iron **(D)** All of these

g. Secondary emission results

(A) When temperature of metals is raised to a level above the crystallization
(B) When metals are subjected to strong magnetic fields
(C) When light rays fall on the metal surface
(D) When a high velocity beam of electrons strikes a metal surface

h. A carbon resistor contains

(A) Solid carbon granules **(B)** Pulverized coal
(C) Finely divided carbon black **(D)** Carbon crystals

i. Electrical resistance of a semi-conductor

(A) Increase with temperature
(B) Decreases with temperature
(C) Remains constant with temperature
(D) None of these

j. Which one of the following is a unipolar device?

(A) FET **(B)** PN diode
(C) Zener diode **(D)** None of these

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

Q.2 a. Explain the electron gas model of a metal. **(8)**

b. Explain the temperature dependence of electrical resistivity and conductivity in conductors. **(8)**

Q.3 a. Explain in brief the various types of polarization phenomena. **(8)**

b. Derive Clausius-Mosotti Relation. **(8)**

Q.4 a. What are the important requirement of a good insulating material. **(8)**

b. What is ferro-electricity? Explain in brief. **(8)**

Q.5 a. Draw B-H Curve for magnetic materials used in electric machines and explain hystersis loop? **(8)**

b. Explain the following in brief:
(i) Nickle-iron alloy
(ii) Ferrites **(8)**

Q.6 a. Classify the materials based on the energy band and explain them. **(8)**

b. What is Hall effect? Derive the relation for Hall voltage. **(8)**

Q.7 a. Explain the following: **(8)**
(i) Thermistor
(ii) Varistor

b. Describe the atomic structure of silicon and germanium. **(8)**

Q.8 a. What is Metal Oxide film resistor? Explain in brief. **(8)**

b. What are the different types of cores? Explain in brief. **(8)**

Q.9 a. Give general properties of Field Effect Transistor (FET). **(8)**

b. Describe diffused junction technique of fabrication in brief. **(8)**