ROLL NO. _____

DipIETE – ET (NEW SCHEME) – Code: DE54

Subject: ENGINEERING MATERIALS

Time: 3 Hours **DECEMBER 2011** **Max. Marks: 100**

NOTE: There are 9 Questions in all.

- **Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.**
- **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. The conductivity of copper is less than that of silver by

(A) 5-10% **(B)** 50% - 60%
(C) 80%-90% **(D)** 20% - 30%

b. The dielectric constant of air is practically taken as

(A) unity **(B)** more than unity
(C) Zero **(D)** less than unity

c. Ceramics are good

(A) insulators **(B)** conductors
(C) super conductors **(D)** Semi conductor

d. Hysteresis loss least depends on

(A) frequency **(B)** Magnetic Field intensity
(C) Volume of material **(D)** Grain orientation of material

e. What is the type of bonding in silicon?

(A) ionic **(B)** covalent
(C) Metallic **(D)** Metallic + ionic

f. Copper is completely miscible with

(A) Nickel **(B)** Gold
(C) Hydrogen **(D)** Lead

g. No. of terminals in a FET are

(A) one **(B)** two
(C) three **(D)** four

h. Copper – constanton thermocouple is used for measuring temperature upto

(A) 1400 ^{0}C **(B)** 1100 ^{0}C
(C) 800 ^{0}C **(D)** 400 ^{0}C

i. In a transistor which of the following region is very lightly doped and is very thin?

(A) Emitter **(B)** Base
(C) collector **(D)** None of the above

j. Carbon – resistor contains

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

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 effect of temperature on electrical conductivity of metals. **(8)**

Q.3 a. What is permanent dipole moment? Explain in brief. **(8)**

b. Derive Clausius-Mossotti relation for solid dielectrics due to internal field. **(8)**

Q.4 a. What are the important requirements of good insulating materials? Give some examples & their applications. **(8)**

b. Discuss various applications of Dielectric materials. **(8)**

Q.5 a. Give the applications and properties of silicon iron alloy and nickel iron alloy. **(8)**

b. Give the properties and application of permanent magnetic materials. **(8)**

Q.6 a. Describe the Hall Effect and explain its relation to the magnetic field on a conductor. **(8)**

b. Write short notes on
(i) Einstein relation (between diffusion constant and mobility)
(ii) Doping in semiconductors **(4+4)**

Q.7 a. Describe atomic structure of silicon and Germanium. **(8)**

b. Explain working of SCR based on its two transistor model. **(8)**

Q.8 a. What is voltage–sensitive resistor? Describe in brief different types of voltage sensitive resistors. **(8)**

b. Give applications of powered iron core and ferrite core. **(4+4)**

Q.9 a. What are the various methods by which junctions are fabricated from pure single crystal semiconductor? **(8)**

b. Discuss Epitaxial diffused junction diode and its applications. **(8)**