

DiplETE – ET (NEW SCHEME) – Code: DE54Subject: **ENGINEERING MATERIALS**

Time: 3 Hours

Max. Marks: 100

DECEMBER 2011**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 – constantan thermocouple is used for measuring temperature upto

- (A) 1400 °C (B) 1100 °C
(C) 800 °C (D) 400 °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 powdered 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)