DipIETE – ET (NEW SCHEME) – Code: DE54

Subject: ENGINEERING MATERIALS

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

JUNE 2010

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.**
- **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. Copper is completely miscible with_____.

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

b. Resistivity of conductor is most affected by_____.

(A) composition **(B)** temperature
(C) pressure **(D)** Current

c. Plastic is_____.

(A) good conductor of heat **(B)** good conductor of electricity
(C) bad conductor of electricity **(D)** high density material

d. The relative permeability of a paramagnetic substance is_____.

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

e. P-N junction is_____.

(A) a rectifier **(B)** an amplifier
(C) an oscillator **(D)** a coupler

f. The dielectric strength of transformer oil should be_____.

(A) 100 V **(B)** 6 V
(C) 30 kV **(D)** 132 kV

g. The voltage dependent resistors are usually made from_____.

(A) Graphite **(B)** Charcoal
(C) Silicon Carbide **(D)** Nichrome

h. Largest current flow of a bipolar transistor occurs_____.

(A) in emitter **(B)** in base
(C) in collector **(D)** through emitter – collector

i. Which of the following statement is not true in case of FET?

(A) It has high input impedance
(B) It is less noisy than bipolar transistor
(C) It has large (gain × band width)
(D) All of the above

j. Variable resistors are generally_____.

(A) carbon resistors **(B)** thin film resistors
(C) thick film resistors **(D)** wire wound resistors

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

Q.2 a. Explain thermionic and photoelectric emission of electrons from metals. **(8)**

b. What is super conductivity? Give a few applications of superconductors? **(8)**

Q.3 Define polarization of a dielectric material. Explain the different types of polarization **(8+8)**

Q.4 a. Distinguish briefly between diamagnetic, paramagnetic and ferromagnetic materials? **(8)**

b. Explain Ferroelectric and piezoelectric materials. Give a few properties and applications of each. **(8)**

Q.5 a. Explain the energy bands in solids. Also, classify the materials based on the basis of energy bands. **(8)**

b. Explain the following: **(4+4)**
(i) Packaging.
(ii) Process aids.

Q.6 a. Explain the term dielectric constant, dielectric loss and significance of loss tangent? **(8)**

b. What specific material would you suggest for the following application? Give reason in each case **(8)**
(i) For making permanent magnet.
(ii) For electrical machine and transformer cores.

Q.7 a. What is 'Thermistors'? Give its application. **(8)**

b. What is a wire wound resistor? Describe different types of wire wound resistors in brief. **(8)**

Q.8 a. What are the various methods by which junction are fabricated from pure single crystal semiconductor? Describe 'Alloyed junction' method. **(8)**

b. Give general properties of Field Effect Transistor (FETs). **(8)**

Q.9 Write short notes on: **(8+8)**

(i) Junction Transistor.
(ii) Different types of relays.