DipIETE – ET (NEW SCHEME) – Code: DE54

Subject: ENGINEERING MATERIALS

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

JUNE 2009

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. Thermocouple work on which of the following effect ?

(A) Thomson effect **(B)** Seaback effect
(C) Pelties effect **(D)**) Joule effect

b. Materials which lack permanent magnetic dipoles are called ?

(A) Diamagnetic **(B)** Ferromagnetic
(C) Semimagnetic **(D)** none of the above

c. Piezoelectric materials serve as a source of

(A) Micro waves **(B)** Ultrasonic waves
(C)) Musical waves **(D)** Resonant waves

d. Breakdown in dielectric may be

(A) Electrical breakdown **(B)** Thermal breakdown
(C) Electrochemical breakdown **(D)** any of the above

e. The number of degree of freedom for monoatomic gas is

(A) 3 **(B)** 5
(C) 6 **(D)** 7

f. A Carbon resistor contains

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

g. The process by which impurities are added to a pure semi conductor is

(A) Diffusing **(B)** Drift
(C) Doping **(D)** Mixing

h. A semi conductor in its purest form is called ?

(A) Intrinsic Semi conductor **(B)** Extrinsic Semi conductor
(C) P-type Semi conductor **(D)** N-type Semi conductor

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. Thermionic emission of electron is due to

(A) Electromagnetic field **(B)** Electrostatic field
(C) High temperature **(D)** Photoelectric effect

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 thermal conductivity of metals. What is the coefficient of thermal conductivity? **(8)**

Q.3 a. Explain the effect of a dielectric on the behavior of a capacitor. **(8)**

b. What is permanent dipole moment? Explain in brief. **(8)**

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

b. Explain dielectric properties of polymeric system. **(8)**

Q.5 a. Explain the Process of magnetization of a magnetic material. Draw hysteresis loop for a magnetic material. **(8)**

b. What are the different factors affecting permeability and hysteresis loss of a magnetic material. **(8)**

Q.6 a. Describe the Hall effect and explain its relation to the magnetic field on a conductor. Show that the Hall coefficient is equal to $\frac{1}{N_e}$ (m^3/ coulomb) **(8)**

b. What are the different types of semiconductor? Explain N-type and P-type Semiconductor with the help of energy band diagram. **(8)**

Q.7 a. What is the difference between Thermisters and Varistors? Describe 'Thermisters' in brief. **(8)**

b. What is Junction Transistors? Describe in brief working of two types of transistors. **(8)**

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

b. What is the function of a relay? How they can be classified in different categories. Explain in brief. **(8)**

Q.9 a. Give general properties of field effect transistor (FET). Mention distinguishing properties of FET from bipolar. **(4+4)**

b. What are the various methods by which junctions are fabricated from pure single crystal semiconductor? Describe 'Grown Junction' method. **(8)**