ROLL NO. _____

Code: DE54 **Subject: ENGINEERING MATERIALS**

DipIETE – ET

Time: 3 Hours **DECEMBER 2013** **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. Platinum is

(A) Greyish White metal **(B)** Non-Corrosive and chemical proof
(C) Malleable and ductile metal **(D)** All of these

b. The conductivity of aluminium is

(A) Equal to copper **(B)** Half of that of copper
(C) One third that of copper **(D)** None of these

c. Dielectric loss may occur due to

(A) Polarisation **(B)** Conductivity
(C) Ionisation **(D)** None of these

d. Small magnets are made by

(A) Special casting techniques **(B)** Power metallurgy technique
(C) Heat treatment **(D)** All of these

e. In a semiconductor the resistivity decreases with temperature in following ways

(A) Linearly **(B)** Non- linearly
(C) Exponentially **(D)** None of these

f. Silicon Diode has an advantage over Germanium Diode is

(A) More sensitive to weak signals
(B) Higher melting point
(C) Continuous operation at temp over $+60^0$
(D) None of these

g. Tunnel Diode

(A) has negative resistance region
(B) increases depletion region
(C) act as voltage variable capacitor
(D) is designed to handle high power and high temperature

h. Dielectric material are essentially

(A) Insulating material **(B)** Conducting material
(C) Semi conducting material **(D)** Ferro-electric material

i. The relative permeability of a paramagnetic substance is

(A) Unity **(B)** Slighty more then unity
(C) Zero **(D)** Less then unity

j. Heat Sink are used with ICs to

(A) Enhance reliability **(B)** Percent derating
(C) Minimize leakage **(D)** All of these

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

Q.2 a. What are soft and hard ferrites and where they are used? **(6)**

b. Why Iron Silicon alloys are preferred for power transformers, motors and generators? **(4)**

c. Give the applications of following material **(6)**
(i) Alnico (ii) Hard Ferrites

Q.3 a. Explain, what causes the decrease in resistivity of an intrinsic semiconductor at high temperature? **(4)**

b. What is Hall effect? What are the applications of Hall effect generator? **(4)**

c. What are important properties of semiconductor? **(4)**

d. Compare in brief the materials used in IC packaging. **(4)**

Q.4 a. What are different types of diode? Discuss each briefly. **(8)**

b. What are different methods of manufacturing transistor? Explain Alloy type method in detail. **(8)**

Q.5 a. Describe the construction detail of relays and List common type of relays. **(8)**

b. An air capacitor of capacitance 0.005 μF is connected to direct voltage of 500V, is disconnected and then immersed to oil with a relative permittivity of 2.5. Find the energy stored in the capacitor before and after immersion. **(8)**

Q.6 a. Explain the following processes of fabrication technology.
(i) Oxidation (ii) Metallization **(10)**

b. Describe 'Grown Junction' method of Fabrication in brief. **(6)**

Q.7 a. Explain, how permittivity of a dielectric material is analogous to permeability of magnetic material ? **(5)**

b. State the factors which affects the dielectric loss of an insulating material. **(4)**

c. Explain Dielectric breakdown in gasses. **(7)**

Q.8 a. What is Mobility? Describe in brief. **(8)**

b. The resistance of a wire is 60 Ω or 25^{o}C and 65 Ω at 75^{o}C. Find the resistance of wire at 10^{o}C and value of temperature coefficients at 0^{o}C **(8)**

Q.9 Explain polarization mechanism and give the comparison of electronic, ionic and dipole polarization. **(16)**