Code: DE104   Subject: **ELECTRONIC ENGINEERING MATERIALS**

DipIETE – ET/CS *{NEW SCHEME}*

Time: 3 Hours   **DECEMBER 2014**   **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. The magnetization of super conductor is _____

   (A) zero   **(B)** –B
   (C) –1   **(D)** –H

  b. Nicrome is alloy of _____

   (A) Copper + Ni   **(B)** Cu + Zn + Ni
   (C) Fe + Cr + Ni   **(D)** Fe + Cu + Ni

  c. Working of thermocouples is based on _____

   (A) Thomson effect   **(B)** Seeback effect
   (C) Peltier   **(D)** none of these

  d. With increase in temperature, the orientation polarization_____

   (A) increases   **(B)** decreases
   (C) is constant   **(D)** none of these

  e. In the polarization - field strength plot for a ferroelectric crystal, Ps stands for_____

   (A) Space charge polarization
   (B) Spontaneous polarization
   (C) Saturation Polarization
   (D) None of these

f. The temperature of the anti ferromagnetic to paramagnetic transition is_____

   (A) Neel temperature
   (B) Debye temperature
   (C) Curie-Weiss temperature
   (D) Curie temperature

g. Forbidden energy gap in Insulators at room temperature is in the range of____

   (A) 1 ev   **(B)** 6 ev
   (C) 0 ev   **(D)** –2ev

h. The gown single crystal generally contains _____

   (A) tilt boundaries   **(B)** twin boundaries
   (C) grain boundaries   **(D)** dislocation loops

i. Which of the following is used as voltage regulator _____

   (A) Zener diode   **(B)** BJT
   (C) JFET   **(D)** SCR

j. Non-linear resistor is

   (A) carbon resistor   **(B)** thermistor
   (C) wire wound resistor   **(D)** none of these

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

Q.2 Explain the following: **(2×8)**

   a. Superconductivity
   b. Thermoelectric effect

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

   b. What is polarizability? How it is affected by internal fields developed in solids?   **(8)**

Q.4 a. What is dielectric loss? Write significance of loss tangent.   **(4+4)**

   b. What is piezoelectricity? Explain it with example.   **(2+6)**

Q.5 a. Discuss the following:-   **(4+4)**
      (i) Magnetostriction
      (ii) Factors affecting permeability

   b. Explain magnetic resonance.   **(8)**

Q.6   a.   What is Diffusion in semiconductors? How it is related with Einstein equation.

(4+4)

b.   Discuss the following:-   **(4+4)**

(i) Thermal conductivity of semiconductors
(ii) Electrical Conductivity of doped materials

Q.7   a.   Discuss Zener & Avalanche breakdown in semiconductors.   **(8)**

b.   What is SCR? Explain its two transistor model & draw its V-I characteristics.

(2+4+2)

Q.8   Discuss construction features & write applications of the following: **(4×4)**

(a)   Wire – wound resistor
(b)   Variable capacitors
(c)   Inductors
(d)   Reed Relay

Q.9   Explain the following :   **(2×8)**

(a)   Alloyed junction process
(b)   Operation of JFET with high drain voltage