Printed Pages : 2 **EEE403**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 0209 Roll No. | | | | | | | | | | |

B.Tech.

(SEMESTER IV) THEORY EXAMINATION, 2012-13

ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

Time : 2 Hours] *[Total Marks : 50*

SECTION – A

5 × 2 = 10

1. Attempt any **five** parts :
   (a) What is forbidden energy gap ?
   (b) What do you understand by Miller indices of a crystal plane ?
   (c) Define crystal lattice.
   (d) State Seeback effect and Thomson effect.
   (e) Explain the use of isotope effect in super conductors.
   (f) Differentiate between extrinsic and intrinsic semiconductors.
   (g) Explain the temperature dependence of the resistance of a semiconductor.
   (h) Give any two applications of ferrites.
   (i) Draw and explain hysteresis curve.
   (j) State Hall effect.

SECTION – B

2. Attempt any **three** question parts : **3 × 5 = 15**
   (a) (i) What are X – rays ? How are they produced ? Discuss their properties.
   (ii) Write short notes on different types of bonds in solids.
   (b) Discuss the effect of temperature and impurity on the conductivity of a metal. Determine the temperature coefficient of resistance of material used in a resistor if the resistance at 25°C is 45 ohm and at 75°C is 59 ohms.

(c) Derive an expression for the electrical conductivity of a metal on the basis of classical free electron theory.

(d) Derive the expression for drift and diffusion currents in semiconductor.

(e) Explain magnetic hysteresis on the basis of domain theory.

SECTION – C

Attempt **all** questions : **5 × 5 = 25**

3. Attempt any **one** part : **1 × 5 = 5**

(a) Explain and deduce Bragg's law in X-ray diffraction.

(b) Describe in short the formation of energy band in solids and hence explain how it helps to classify the materials in to conductors and insulators.

4. Attempt any **one** part : **1 × 5 = 5**

(a) Derive the expression for heat development in a current carrying conductor.

(b) Explain Josephson effect in superconductors.

5. Attempt any **one** part : **1 × 5 = 5**

(a) Derive Widemann-Frantz law for a conducting material and give its importance.

(b) What is a P-N junction ? What happens when P-N junction is biased in forward direction ?

6. Attempt any **one** part : **1 × 5 = 5**

(a) Derive the relation between Hall coefficient and carrier density. Assume the presence of only one type of charge carrier.

(b) Explain the working principle of a FET. Discuss also the advantages of FET over bipolar transistor and vacuum tubes.

7. Attempt any **one** part : **1 × 5 = 5**

(a) Distinguish between dia, para and ferromagnetic materials.

(b) Explain hard and soft magnetic materials with examples.