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

Paper ID : 121407   Roll No.

B.TECH.

Theory Examination (Semester-IV) 2015-16

ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

Time : 3 Hours   *Max. Marks : 100*

Section-A

Q1. Attempt all parts & all parts carry equal marks. Write answer of each part in short.   (2×10=20)

(a) What do you mean by space latice?

(b) Who discovered X-rays?

(c) State the laws of photoelectric emission.

(d) What do you mean by "magnetic Anisotropy"? Explain.

(e) What are the eddy current losses? How can they be reduced?

(f) What is Zener diode? Draw it V-I diagram.

(g) How is p - type semiconductor produced?

(h) Electrons are emitted with zero velocity for a certain metal surface when it is exposed to radiations of $\lambda = 6800$ A°. Calculate the threshold frequency and work function of metal.

(i) What is Bragg's Law.

(j) Explain temperature dependence of reverse saturation current.

Section-B

Q2. Attempt any five questions.   **($10\times5=50$)**

(a) What is Atomic Packing factor? Calculate its valve for simple cube and body centered cube. How many atoms per square millimeter are there on the (100) plane of lead? Assume the interatomic distance as 3.499 A.

1   (2)   P.T.O.

(b)   Write short notes :

    (i) Miller indices

    (ii) X-ray crystallography

(c)   Explain the phenomenon of magnetostriction with reference to iron and nickel. Mention major application of magnetostrictive materials.

(d)   Explain the working of a JFET. Discuss also the advantage of JFET over bipolar transistor and vacuum tubes.

(e)   Explain superconductivity.

A specimen of copper wire has resistivity of 1.6×10^{-6} ohm-cm at $0^{o}C$ and a temperature co-efficient of resistance of $\dfrac{1}{254.5}$ at 20° C find the resistivity and temperature co-efficient at $50^{o}C$.

(f)   Differentiate between

    (i) Diamagnetism and paramagnetism and

    (ii) Soft and hard magnetic materials

(g)   Using drift and diffusion current in a semiconductor, find an expression of continuity equation.

Section-C

Note: Attempt any two questions. (15×2=30)

Q3. Sketch and explain typical hysteresis loops for soft iron, hard steel and ferrite. On the basis of hysteresis loops discuss the application of these magnetic materials.

Q4. Explain the effect of temperature on electrical conductivity of metals.

The following data refer to copper-

Density=8.94 gm/cm^3, resistivity=1.73×10^{-8}Ωm; atomic weight = 63.5

Calculate the mobility and average time of collision of electron in the copper.

Q5. What is Hall Effect? Derive the relation between hall coefficient and carrier density. Assume the presence of only one type of charge carrier.

The resistivity of semiconductor material is 0.00912 Ωm at room temperature. The flux density in the hall model is 0.48 Wb/m^2. Calculate the hall angle for a hall co-efficient of 3.55×10^{-4}m^3/columb.