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B.TECH.
THEORY EXAMINATION (SEM–IV) 2016-17
ELECTRICAL AND ELECTRONICS ENGINEERING MATERIAL

Time : 3 Hours *Max. Marks : 100*

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION – A

1. Explain the following: **10 x 2 = 20**

(a) What do you mean by co-ordination number ?

(b) Find the miller indices for a plane when the intercepts along the axes are 2a, 3b and 2c.

(c) What is the difference between crystalline and non-crystalline material?

(d) Explain seebeck effect.

(e) What is superconductivity? Name some super-conducting material.

(f) Differentiate between drift and diffusion current.

(g) What happen when a p-n junction is biased in forward direction?

(h) Why does a pure semiconductor behave like an insulator at absolute zero?

(i) Give relationship between relative permeability and magnetic susceptibility.

(j) Draw hysteresis curve for a ferromagnetic material.

SECTION – B

2. Attempt any five of the following questions: **5 x 10 = 50**

(a) Define the following: (i) Unit cell (ii) Space lattice (iii) Atomic packing factor

(b) Explain Bragg's law. How Bragg's equation can be used to determine the lattice parameters. Determine the interplanar distance in a crystal in which a series of planes produce a first order reflection from a copper X-ray tube ($\lambda = 1.539$Å) at an angle of 22.5°.

(c) Explain the "Meissner Effect". Also explain Type-I and II superconductors with examples.

(d) Derive an expression for heat developed in a current carrying conductor. Also explain the factors responsible for it.

(e) Explain in detail p-n junction diode and its VI characteristics.

(f) Distinguish between insulator, conductors and semiconductor on the basis of band theory. Give the electrical characteristics of n-type and p-type semiconductors.

(g) How do you classify the material as dia, para or ferromagnetic? Explain ferromagnetism in detail.

(h) What is magnetostriction? How many types are possible?

SECTION – C

Attempt any two of the following questions: **2 x 15 = 30**

3 Determine the atomic packing factor of the following:

(i) Simple cubic crystal

(ii) Body centered cubic crystal

(iii) Face centered cubic crystal.

4 What is Hall Effect in semiconductor? The resistivity of doped silicon crystal is 9.23×10^{-3} Ω-m and hall coefficient is 3.84×10^{-4} m^3C^{-1}. Assuming that the conduction is by a single type of a charge carrier calculate the density and mobility of carrier.

5 (i) Distinguish between soft and hard magnetic materials. Discuss and explain typical B-H curve for soft magnetic material.

(ii) Determine the temperature coefficient of resistance of material used in a resistor if the resistance at 25°C is 50 Ω and at 70°C is 57.2 Ω.