

B. TECH.
(SEM VIII) THEORY EXAMINATION 2018-19
ELECTRICAL & ELECTRONICS ENGINEERING MATERIALS

Time: 3 Hours

Total Marks: 100

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- a. Draw (112) & (111) planes in simple cubic cell.
- b. Write ohms law for electron theory.
- c. What do you mean by doping in semiconductor?
- d. What is Curie temperature?
- e. Explain Seebeck, Thomson Effect in thermocouple.
- f. Mobility of electrons & holes in intrinsic semiconductor of germanium at room temperature are $3600 \text{ cm}^2/\text{v-s}$ & $1700 \text{ cm}^2/\text{v-s}$. if electrons & holes are equal to $3.2 \times 10^{12} / \text{cm}^3$, find out conductivity.
- g. What is Magnetostriction and its types?
- h. Explain Body centered cubic structure (BCC)
- i. Write composition of Alnico.
- j. Explain Metallic bonding with diagram.

SECTION B

2. Attempt any three of the following: 10x3=30

- a. Explain the effect of temperature on electrical conductivity of metals. The following data refer to copper-
Density= 8.94 gm/cm^3 , resistivity= $1.73 \times 10^{-8} \Omega\text{m}$; atomic weight = 63.5
Calculate the mobility and average time of collision of electron in the copper.
- b. Explain Bragg's Law, X ray of wavelength 1.54 Å are used for calculating d_{200} in Ni. The reflection angle is 9.5 degree, what is size of unit cell.
- c. Using drift and diffusion current in a semiconductor, find an expression of continuity equation.
- d. Draw Diagrams giving energy band structure of an Conductor, insulator & semiconductor. Explain difference in their conductivity?
- e. Describe soft and hard magnetic material indicates their composition, property also draw their B-H curve.

SECTION C

3. Attempt any one part of the following:

- a. State Ionic, Covalent & Metallic bonds with their characteristics.
- b. Explain Miller indices, write procedure to find it. Also prove that $d_{100}:d_{110}:d_{111}:\sqrt{6}:\sqrt{3}:\sqrt{2}$ for a simple cubic system.

4. Attempt any one part of the following:

- a. Write short note- Soft Magnetic material, Hard Magnetic material also draw their B-H curve.
- b. Explain Ferromagnetism, Ferri magnetism, Anti ferromagnetism material with their properties.

5. Attempt any one part of the following:

- a. With the help of neat sketches and characteristic curves explain the operation of the Junction FET.
- b. Calculate the drift velocity of electrons & holes in (i) Si (ii) Ge at 300K when applied electric field is 50v/cm take $\mu_p = 500 \text{ cm}^2/\text{v-s}$, $\mu_n = 1500 \text{ cm}^2/\text{v-s}$ for Si , $\mu_p = 3700 \text{ cm}^2/\text{v-s}$, $\mu_n = 3600 \text{ cm}^2/\text{v-s}$ for Ge.

6. Attempt any one part of the following:

- a. Write short notes on followings:
 - (i) Fermi surface
 - (ii) Energy gap
 - (iii) Energy level
- b. Find energy loss per hour in Iron subjected to magnetization 50 c/s . the iron weight 50 kg & hysteresis loop area 250 joules / m³. Density of iron= 7000 kg/m³

7. Attempt any one part of the following:

- a. What is Hall Effect; derive the relation between hall coefficient and current density. Assume presence of only one charge carrier.
- b. Explain the term superconductivity. Name some of the important superconductivity elements compound and alloys.