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Printed Pages : 3 TEE – 403

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

PAPER ID : 2053 Roll No. | | | | | | | | | | |

# B. Tech.

## (SEM. IV) EXAMINATION, 2007-08

## ELECTRICALS & ELECTRONICS ENGINEERING MATERIALS

*Time : 3 Hours]* *[Total Marks : 100*

***Note:*** *(1) Attempt **all** questions.*

*(2) **All** questions carry **equal** marks.*

1 Attempt any **four** parts of the following : **4×5**

(a) Describe briefly the basic seven crystal systems.

(b) Define the following:

(i) Unit cell

(ii) Space lattice

(iii) Body centered cubic structure.

(c) State and explain Bragg's law. How it can be used to determine lattice parameters?

(d) What is `Atomic Packing Factor? Calculate its value for simple cube and body centered cube structure.

(e) Derive the relation between interplanar spacing`d' and cube edge `a'.

(f) Draw the following directions in a face centered cubic structure (112), (001) and (101)

2 Attempt any **four** parts of the following : **4×5**

(a) Explain Seeback, Peltier and Thomson effects.

(b) Explain Superconductivity. What is the effect of magnetic field on the superconductors?

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

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

(e) In a certain copper conductor, the current density is 2.4 $A/mm^2$ and electron density is $5\times10^{28}$ free electrons per $m^3$ of the copper. Determine the drift velocity of the electrons. Given $e=1.6\times10^{-19}$ coulomb.

(f) Explain the factors which affect the resistivity of conducting materials.

3 Attempt any **two** parts of the following. **2×10**

(a) Describe various mechanisms of dielectric polarisation and derive an expression for electronic polarizability.

(b) What is dielectric loss and loss angle? How do loss factor and dielectric constant vary with temperature and frequency of an alternating field? Explain.

(c) Explain with examples :

(i) Piezoelectricity and

(ii) Ferroelectricity.

4 Attempt any **two** parts of the following **2×10**

(a) What is Hall Effect? Explain its origin and derive the relation between Hall coefficient and carrier density.

(b) (i) Discuss in brief the mechanism of conduction in N-type and P-type semiconductors.

(ii) Differentiate between intrinsic and extrinsic semiconductors.

(c) (i) Explain in brief P-N-P and N-P-N transistors.

(ii) Give constructional details of Junction Field Effect Transistors (JFET).

5 Attempt any **two** parts of the following: **2×10**

(a) Explain the phenomenon of

(i) magnetostriction and

(ii) hysteresis in ferromagnetic materials

(b) How do you classify the materials as dia, para or ferromagnetic? Explain ferromagnetism and antiferromagnetism.

(c) (i) Differentiate between soft and hard magnetic materials.

(ii) Explain briefly following mechanical properties of metals:

Elasticity, Plasticity, Ductility and Malleability.

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