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324411 (24)

BE (4th Semester)

Examination, Nov.-Dec., 2014

Branch : Electrical

ELECTRICAL ENGINEERING MATERIALS

Time Allowed : Three Hours

Maximum Marks : 80

Minimum Pass Marks : 28

ote : Part (a) is compulsory in each question and attempt any two parts from remaining (b), (c) and (d).

Unit-I

Q. 1. (a) Define conductivity and resistivity of conducting materials. 2

P.T.O.

(b) Derive an expression for electrical conc... in a metal in terms of mobility of electro...

(c) Explain the terms, Relaxation time, mean... path and hence derive the expressio... relaxation time. Q. 2.

(d) A specimen of pure copper has a resisti... 1.56×10^{-8} Ωm at 300°K. If Ni is added t... the resistivity increases by 1.25×10^{-8}... per atomic percentage of Ni. Simila... silver is added the resistivity increase... 0.14×10^{-8} Ωm per added atomic perce... of silver. For an alloy of 0.2 atomic perce...

of Ni and 0.4 atomic percentage of Silver in Copper, what is the theoretical resistivity of alloy at 300°K. Also calculate percentage increase in resistivity for above alloy and for pure copper at 300°K. 7

Unit-II

Q. 2. (a) What are the characteristics of semi-conductors ? 2

(b) Derive the expression for the conductivity of doped semiconductor. 7

(c) Explain Hall effect. How the density of charge carriers in a semiconductor can be found out from the measurement of Hall effect ? 7

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(d) Determine the number density of dono which has to be added to an intri semiconductor to produce an semiconductor of conductivity 5 Ω/cm that the mobility of electrons in the semiconductor is 3850 $cm^2/V\text{-}s$.

Unit-III

Q. 3. (a) Define Magnetostriction.

(b) Define magnetic materials. Explain classification of magnetic materials.

(c) Write notes on Hard and Soft Ma materials.

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(d) What are Ferrites ? Give their characteristics and application. 7

Unit-IV

Q. 4. (a) Define dielectric strength and breakdown voltage. 2

(b) What is the main functions of transformer oil ? Why its strength deteriorates ? And what are the remedies ? 7

(c) Define dielectric constant and polarization. Hence derive the formula

$P = (\epsilon - 1)\epsilon_0 E$. 7

where the symbols have their usual meanings.

(d) Classify the solid insulating materials on the basis of temperature. 7

Unit-V

Q. 5. (a) What is photo emission ? 2

(b) Explain "Destrain effect". 7

(c) What do you mean by electroluminescence ? Discuss about electroluminescence junction diode. 7

(d) Write a note on optical properties of semiconductors. 7