Q.4 a. The resistivity of pure copper is 1.56μΩ-cm. An alloy of copper containing1atomic per cent nickel has a resistivity of 2.81 μΩ-cm. An alloy of copper containing 3 atomic percent silver has a resistivity of 1.98 μΩ-cm. What is the resistivity of an alloy containing 2 atomic percent nickel and 2 atomic percent silver?

Answer:

ρ_{cu} = 1.56
$\rho_{(cu+Ni)}$ = 2.81
ρ_I , Increase in resistivity for one atomic percent added impurity (Nickel)
$\rho_{I(nickel)}$ = 1.25
= 2.81-1.56=1.25
$\rho_{I(silver)} = \frac{1.98-1.56}{3} = 0.14$
$\rho_{alloy} = 1.56 + 2 \times 1.25 + 2 \times 0.14 = 4.34\mu\Omega - cm$

TEXT BOOKS

1. Materials Science and Engineering – A First Course by V. Raghavan, Fifth Edition, Thirty-Fourth Print, April 2007 Edition, Prentice-Hall Of India Pvt Ltd.

2. Introduction to Electrical Engineering Materials by C.S. Indulkar and S. Thiruvengadam, 4th Edition, Reprint 2006, S. Chand and Company Ltd.