Pokhara University

Everest Engineering College

Final Assessment II
Fall - 2020

Level: Bachelor F.M. 100
Program: BE(Cmp) P.M. 45
Faculty: Science & Technology Time:3hrs
Subject: Electrical Engineering Materials (3rd Semester)

Attempt all the questions.

1	a)	Show that the difference in energy between any two consecutive energy levels of a free particle inside infinite potential well is inversely proportional to the square of well length.	**8**
	b)	Silver has the FCC crystal structure. The atomic mass of silver is 107.87 g/mol and the radius of silver atom is 0.1444 nm. Calculate the lattice parameter, density,atomic concentration and atomic packing factor of silver.	**7**
2	a)	What are magnetic domains? Explain domain wall motion in a ferromagnetic material.	**8**
	b)	Describe ionic conduction in electrolyte and show that ionic conduction in electrolyte depends on temperature.	**7**
3	a)	What is electronic polarization? Derive the mathematical relation showing the relation between electronic polarization and relative permittivity, using Clausius-Massotti equation.	**8**
	b)	A parallel plate capacitor of area 20 cm^2 and separation of 1mm. The space between plates is filled with Al_2O_3 .When potential difference of 10V is applied, calculate field strength and dipole moment induced in oxide layer. Assume relative permittivity of Al_2O_3= 8	**7**

4	a) Why silicon is preferred for semiconducting materials than Germanium? Explain the Floating Zone process of crystal growth with necessary figure. b) A pn junction Semiconductor has resistivity of 5Ω-cm. If mobility of hole is 450 $cm^2 V^{-1} S^{-1}$ and electron mobility is three times the mobility of hole. At room temperature,find (i) Built in potential (ii) depletion width that lies in n-region and p-region and (iii) built in electric field at x= 0 (Given, $n_i = 1.45 \times 10^{10}$ cm^{-3} at T = 300 K, ε_r =11.9 for Si)	**8** **7**
5	a) What is minority carrier suppression? Prove electron concentration in n – type semiconductor is defined by impurity donor. b) In an n-type semiconductor, the Fermi level lies 0.4 eV below the conduction band. If the concentration of donor atoms is doubled find the new position of the Fermi level.Assume K_BT = 0.03 eV.	**8** **7**
6	a) What is diffusion? State and explain Fick's law. Derive Einstein's relation between diffusion coefficient and mobility of electrons. b) A magnetic field strength in copper is 10 6 ampere/ meter.If the magnetic susceptibility of copper is -0.8 ×10 -5 ,calculate the flux density and magnetization in copper.	**9** **6**
7	Write short notes on: (Any two) a) Chzochralski process b) Compensation doping c) Wave particle Duality	**2* 5= 10**

Best of Luck