Pokhara University

Everest Engineering College

Final Assessment I
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)	Write down the physical significance of wave function ψ. Derive the time dependent Schrödinger wave equation.	**9**
	b)	If electrical conductivity of Potassium is 1.39×10^5 Sm/cm. Calculate the drift mobility of electron at room temperature. Molar mass and density of potassium are 39.95 and 0.91 gm/cc.	**6**
2	a)	Derive the relation for effective mass of an electron ,also give the significance of effective mass of electron.	**8**
	b)	How conduction takes place in gases? Explain briefly on the basis of Townsend's break down mechanism.	**7**
3	a)	What are different types of polarization in dielectric medium? Explain orientational polarization in detail.	**8**
	b)	The crystal of sodium chloride has state dielectric constant of 5.6 and optical index of refraction 1.5. Calculate the percentage contribution of ionic polarizibility.	**7**
4	a)	What are ferromagnetic materials? With the help of hysteresis loop, classify hard and soft magnetic material?	**9**
	b)	Calculate the relative permeability of a paramagnetic material at -73°C and 227°C if the susceptibility of the paramagnetic material at 27°C is 3.7×10^{-3}.	**6**

5	a) Starting from Fermi-Dirac distribution function prove that the Fermi level in intrinsic semiconductor lies midway between the conduction band and valence band. b) In an abrupt Si p^+n junction, the mobility for minority electrons and holes are 120 cm^2- V^{-1} S^{-1} and 440 cm^2 $V^{-1}S^{-1}$ at T = 300 K. The life time of holes in n-region is 417nS, where as that of electrons in the p-region is 5nS. Calculate the diffusion coefficients and minority carrier diffusion lengths.	**8** **7**
6	a) Explain how pn-junction is formed when n - type and p - type semiconductor are brought together. Derive the relation of built in potential of a pn junction. b) Find the resistance of a $1cm^3$ pure Silicon crystal. What is the resistance when the crystal is doped with one Arsenic in 10^9 Silicon atoms? Given: Atomic concentration is Si is 5×10^{22} cm^{-3}, $n_i = 1.45 \times 10^{10}$ cm^{-3}, $\mu_e = 1350$ cm^2 V^{-1} S^{-1} and $\mu_h = 450$ $cm^2V^{-1}S^{-1}$.	**9** **6**
7	Write short notes on: (Any two) a) Face Centered Cubic Lattice b) Schottky Effect c) Epitaxial growth	**2* 5= 10**

Best of Luck