JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

MAKE UP EXAMINATION NOV - 2025

B.Tech-V Semester (CSE/IT)

COURSE CODE (CREDITS): 18B1WPH532 (03)

MAX. MARKS: 25

COURSE NAME: APPLIED MATERIALS SCIENCE

COURSE INSTRUCTORS: PBB, VSA, SKT, SBA, HAZ

MAX. TIME: 1 Hour 30 minutes

Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems. Scientific Calculators are allowed.

Q.No	Question	CO	Marks
Q1	**(a)** Calculate the percentage ionic polarizability in sodium chloride which has the refractive index and static dielectric constant 1.5 and 5.0 respectively.	3	3
	(b) Discuss the role of porosity with respect to the properties in ceramic materials.	5	2
Q2	**(a)** What is dielectric loss? Obtain the expression for energy loss in a dielectric material.	1	3
	(b) Calculate the percentage increase in magnetic induction when the space within a current carrying toroid is filled with magnesium with susceptibility $1.2x10^{-5}$.	3	2
Q3	**(a)** Obtain the expression of classical paramagnetic susceptibility and discuss its variation at low and high temperatures.	2	4
	(b) The saturation value of magnetization of iron is $1.74x10^{6}$ A/m. Iron has body centered cubic structure with an elementary cube edge of 0.286 nm. Calculate the average number of Bohr magnetons contributed to the magnetization per atom.	3	2
Q4	**(a)** Show that for simple two sublattice model, the neel temperature and the curie temperature are same for an antiferromagnetic material.	2	3
	(b) Plot the variation of inverse of susceptibility with temperature for para-, ferro- and antiferro- magnetic materials in a single graph.	1	2
Q5	Determine degree of polymerization and polydispersity index for following Polyethylene ($-(C_2H_4)_n-$) sample:	3	4

M_i (g/mol)	2600	7800	13000	18000
N_i	4200	8050	7100	2050

Constants: $m_e = 9.11x10^{-31}$ kg; $e = 1.6x10^{-19}$ C; $N_A = 6.023x10^{23}$; $k_B = 1.38x10^{-23}$ J/K; $\varepsilon_0 = 8.85x10^{-12}$ F/m; $\mu_B = 9.27x10^{-24}$ Am^2;

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