Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

UG/PG DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL/MAY 2026

Second Semester

Chemical Engineering

PH3258 / UPHT24207 – PHYSICS OF MATERIALS

Regulations – 2021 & 2024

Duration : 3 Hrs *Maximum : 100 Marks*

*PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)*

Q. No	*Questions*	*BLT*	*CO*	*Marks*
1.	Define lever rule.	L1	1	2
2.	What information can be obtained from a phase diagram?	L2	1	2
3.	Recall the Fermi distribution curve its behavior at temperatures above 0 K.	L1	2	2
4.	What is the reason for the perfect diamagnetic behavior exhibited by Type-I superconductors?	L2	2	2
5.	Compare between elemental and compound semiconductors.	L2	3	2
6.	What is solar cell?	L1	3	2
7.	What is dielectric loss in dielectric materials?	L1	4	2
8.	Mention the energies involved in origin of domains in ferromagnetic materials.	L2	4	2
9.	Classify the composite materials on the basis of matrix materials and reinforcement.	L2	5	2
10.	List out the applications of sensors.	L1	5	2

*PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)*

Q. No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		Sketch and describe the phase diagram of a binary system with limited solubility and melting points of the components that are roughly equivalent.	L2	1	16
			Or			
	b		Explain the various methods used to synthesis and prepare nanomaterials.	L2	1	16
12.	a		Using classical free electron theory, derive an expression for electrical and thermal conductivity of a metal.	L3	2	16
			Or			
	b		Apply superconducting concepts, Explain SQUID and Magnetic Levitation.	L3	2	16
13.	a	i	Assuming the fermi dirac distribution, Derive an expression for the concentration of electrons per unit volume in an intrinsic semiconductor.	L3	3	10
		ii	A laser transition takes place from an energy level at 3.2 eV to another level at 1.6 eV. Evaluate the wavelength of the laser beam emitted.	L5	3	6
			Or			

	b	i	Apply Hall effect phenomenon, derive an expression for Hall coefficient in p-type and n-type semiconductors.	L3	3	10
		ii	A semiconducting crystal with 12 mm long, 5 mm wide and 1 mm thick has a magnetic density of 0.5 Wbm^{-2} applied from front to back perpendicular to largest faces. When a current of 20 mA flows length wise through the specimen, the voltage measured across its width is found to be 37 μV. Evaluate the Hall coefficient o this semiconductor.	L5	3	6
14.	a	i	Show how microscopic property of atomic polarizability is related to macroscopic dielectric constant by obtaining expressions for Lorentz internal field.	L2	4	8
		ii	Evaluate the electronic polarizability of argon atom given relative permittivity 1.0024 at NTP and number of atoms per unit volume $2.7X10^{25}$ $atoms/m^3$.	L5	4	8
			Or			
	b	i	Explain in detail about the domain theory of ferromagnetism.	L2	4	8
		Ii	Compare soft and hard magnetic materials.	L5	4	8
15.	a		What are metallic glasses? How they prepared by melt spinning method. Also mention their applications.	L2	5	16
			Or			
	b		Define polymers. What are the different kinds of polymers? Explain in detail the principle and working of semiconductor based polymer. Mention its uses.	L2	5	16

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