

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY****2025****Second Semester****Mechanical Engineering****PH3251/ UPHT24205- Materials Science****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.	Quote the seven crystal systems.	L1	1	2
2.	Record Bravais lattices.	L2	1	2
3.	Write down the expression for the Fermi distribution law.	L1	2	2
4.	Recall Curie Weiss law and its importance.	L2	2	2
5.	What are the differences between elemental semiconductors and compound semiconductors?	L1	3	2
6.	Recognize Schottky diode.	L2	3	2
7.	Relate electro optic effect.	L2	4	2
8.	Mention the types of recombination process.	L2	4	2
9.	What is the condition for Coulomb-Blockade effect?	L2	5	2
10.	List are the applications of single electron Transistor.	L2	5	2

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

Q.No	Questions	BLT	CO	Marks
11.	a Extend the arrangement of atoms in FCC and HCP structures and show that both these structures have the same atomic packing factor.	L2	1	16
	Or			
	b Elaborate crystal defects in a detailed manner.	L2	1	16
12.	a Outline the meaning of 'density of states'. Rephrase the mathematical expressions for the number of allowed states for unit volume of a solid.	L2	2	16
	Or			
	b i Discuss quantum interference devices.	L2	2	8

	ii	Demonstrate the working of magnetic hard disc based on GMR sensor.	L2	2	8
13.	a	Obtain an expression for density of electrons in the conduction band of an n- type and density of holes in the valence band of a p type extrinsic semiconductor.	L2	3	16
		Or			
	b	What is Hall effect? Derive an expression for Hall coefficient. Describe an experiment for the measurement of the Hall coefficient and mention its applications.	L2	3	16
14.	a i	Summarize carrier generation and recombination in semiconductor.	L2	4	8
	ii	Outline the construction and working of a solar cell.	L2	4	8
		Or			
	b	Depict the construction and working of laser diodes. What are the advantages of these diodes?	L2	4	16
15.	a	Translate quantum confinement and quantum structures in Nanomaterials.	L2	5	16
		Or			
	b	Comphrend carbon nano tubes with their properties and applications.	L2	5	16