Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

Second Semester

Artificial Intelligence and Data Science

PH3256/UPHT24202 - Physics for Information Science

(common to Information Technology & Computer Science and Engineering)

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.	State Wiedemann-Franz law.	L1	1	2
2.	A solid is maintained at a temperature of T K. Determine the probability of finding electrons at an energy level kT above the Fermi energy level.	L2	1	2
3.	Compare direct and indirect band gap semiconductors.	L2	2	2
4.	Name the majority of charge carriers in n-type and p-type semiconductors.	L1	2	2
5.	A magnetic material has a magnetic susceptibility of 0.01 and it is placed in a magnetic field strength of 500 A/m. Find the magnetization of the material.	L2	3	2
6.	Recall the magnetic principle involved in computer data storage.	L1	3	2
7.	Define carrier generation and recombination processes.	L1	4	2
8.	Write the techniques associated with optical data storage.	L1	4	2
9.	Define quantum confinement and its types.	L1	5	2
10.	List any two advantages of quantum computing over classical computing.	L1	5	2

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

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Derive an expression for electrical conductivity and thermal conductivity of a metal based on classical free electron theory.	L3	1	16
		Or			
	b	Apply the concepts of quantum theory, derive an expression for the density of energy states of metals.	L3	1	16
12.	a	Derive the expressions for the density of electrons in the conduction band and the density of holes in the valence band of an intrinsic	L2	2	16

		semiconductor.			
		Or			
	b i	Explain the variation of carrier concentration with temperature in n-type and p-type semiconductors.	L2	2	10
	ii	Derive the expression for Hall coefficient in n-type semiconductor.	L2	2	6
13.	a	Distinguish between dia, para and ferromagnetic materials.	L4	3	16
		Or			
	b i	Examine the ferromagnetic domain theory.	L4	3	8
	ii	Difference between soft and hard magnetic materials with examples.	L4	3	8
14.	a	Explain the absorption and emission of light in metals, semiconductors and insulators.	L2	4	16
		Or			
	b	Explain the principle, construction and working of light-emitting diode. Mention its merits and demerits.	L2	4	16
15.	a	Explain the construction and working of single electron transistors. Also mention its advantages and disadvantages.	L2	5	16
		Or			
	b	Explain controlled NOT quantum gate with the necessary truth table and diagrams.	L2	5	16