Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

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

Second Semester

Electronics and Communication Engineering

PH3254 / UPHT24204 - PHYSICS FOR ELECTRONICS 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.	What is a unit cell?	L1	1	2
2.	Define the terms wafer flats and notches.	L1	1	2
3.	Write down the expression for the Fermi distribution function.	L1	2	2
4.	How is the GMR effect used in modern data storage devices?	L2	2	2
5.	Can you explain how electrons behave differently in indirect and direct band gap semiconductors?	L2	3	2
6.	How do Ohmic diodes differ from Schottky diodes?	L2	3	2
7.	What are the different types of optical materials?	L1	4	2
8.	Define Plasmonics.	L1	4	2
9.	What is meant by quantum confinement?	L1	5	2
10.	State the principle of spintronics?	L2	5	2

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

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a	i	Describe the seven systems of crystals with suitable diagrams.	L2	1	8
		ii	Describe the structure of face centered crystal (FCC) system. Also, calculate the atomic packing factor of the system.	L2	1	8
			Or			
	b	i	Describe the steps to determine the miller indices.	L2	1	6
		ii	Explain the physical significance of the interplanar spacing in a crystal structure and derive its mathematical expression for a cubic lattice using Miller indices.	L2	1	10
12.	a	i	Derive an expression for the density of energy state in metals.	L2	2	12
		ii	The thermal conductivity of copper at 300 K is 470.4 W/m/K. Calculate electrical conductivity. Given Lorentz number, L= 2.45 x 10^{-8} WΩK^{-2}	L3	2	4
			Or			

	b	i	Explain the properties of Dia, Para and Ferro magnetic materials.	L2	2	12
		ii	The saturation magnetic induction of nickel is 0.65 wb/m^2. If the density of nickel is 8906 kg/m^3 and its atomic weight is 58.7. Calculate the magnetic moment of the nickel atom in bohr magneton.	L3	2	4
13.	a	i	Derive an expression for concentration of electrons in the conduction band in a N-type semiconductor.	L2	3	12
		ii	Explain about the energy band diagram of intrinsic semiconductor.	L2	3	4
			Or			
	b	i	Explain the theory of Hall effect and explain the expression for Hall coefficient.	L2	3	12
		ii	Describe about carrier transport in semiconductors.	L2	3	4
14.	a	i	Explain optical absorption in semiconductors.	L2	4	6
		ii	Explain the principle, construction and working of Solar cells.	L2	4	10
			Or			
	b	i	Explain the construction and working of a Laser Diode. Give their advantages, Disadvantages and applications.	L2	4	12
		ii	Describe excitons with examples.	L2	4	4
15.	a	i	How does the energy band gap change as the particle size decreases to the nanoscale?	L3	5	4
		ii	Design a transistor in which the current flows from source to drain due to movement of only one electron at a time. Explain the conditions necessary for this single electron phenomenon and the working of the single electron transistor.	L3	5	12
			Or			
	b	i	How do the unique structural and chemical properties of different types of carbon nanotubes influence their applications across various scientific and industrial fields?	L3	5	12
		ii	How could quantum resistance principles be applied to develop more energy-efficient electronic components?	L3	5	4

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