Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV/DEC 2025

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.	Sketch the (001) and (110) planes for a cubic crystal.	L2	1	2
2.	Infer the term wafer flats and notches.	L2	1	2
3.	Recall drift velocity and relaxation time.	L1	2	2
4.	Calculate the Fermi energy of copper at 0°K if the concentration of electron is 8.5×10^{28} m^{-3} ($m=9.1 \times 10^{-31}$).	L3	2	2
5.	What is the difference between elemental and compound semiconductor?	L2	3	2
6.	State the phenomenon of negative temperature coefficient of resistance for semiconducting materials.	L2	3	2
7.	Is direct bandgap semiconductor used for fabrication of optical devices? Comment on it.	L3	4	2
8.	Recite the word Plasmonics.	L1	4	2
9.	Discuss about Quantum resistance.	L1	5	2
10.	Mention any four applications of Carbon Nanotubes.	L1	5	2

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

Q.No			*Questions*	*BLT*	*CO*	*Marks*
11.	a		Describe an HCP structure. Show that for an HCP structure c/a = 1.633 and hence calculate the packing fraction for the HCP structure.	L3	1	16
			Or			
	b	i	Show that for a cubic structure the inter-planar distance 'd' in terms of miller Indices and the cell edge 'a' is given by $d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$	L3	1	10
		ii	Calculate the interplanar spacing between (111), (200) and (220) planes in FCC crystal. Given the atomic radius 1.246 Å.	L3	1	6

12.	a		Derive an expression for both electrical and thermal conductivity of electrons in metal.	L3	2	16
			Or			
	b	i	Evaluate the limitations of the tight binding approximation in accurately predicting the properties of complex materials.	L5	2	8
		ii	Evaluate the significance of GMR effects in the development of spintronic devices and their potential applications.	L5	2	8
13.	a		Derive expressions for carrier concentration and Fermi energy in a n-type semiconductor. Explain the variation of Fermi level with temperature and donor impurity concentration.	L3	3	16
			Or			
	b	i	How would you explain the role of carrier drift and diffusion in current generation within a semiconductor?	L3	3	10
		ii	Write an essay on Schottky diode.	L3	3	6
14.	a	i	How will you classify optical materials?	L2	4	6
		ii	Describe in detail about the optical process in semiconductors and quantum well.	L2	4	10
			Or			
	b		Explain the principle and working of solar cell with a neat diagram and mention its merits and demerits.	L2	4	16
15.	a	i	Explain the density of states in quantum well and quantum dot structures.	L2	5	10
		ii	Explain the bandgap of nanomaterials of conductors and insulators.	L2	5	6
			Or			
	b	i	Describe the construction and working of single electron transistors.	L2	5	10
		ii	Discuss about spintronic devices and its applications.	L2	5	6