

THE KAVERY ENGINEERING COLLEGE*(An Autonomous Institution)***B.E/B.TECH DEGREE END SEMESTER THEORY EXAMINATIONS, NOV /DEC 2024***Second Semester**Electrical and Electronics Engineering***PH3202 - Physics for Electrical Engineering***Regulations - 2021**Duration : 3 Hrs**Maximum : 100 Marks***PART - A (ANSWER ALL QUESTIONS) (Marks 10*2 = 20)**

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
1.	Write the Causius - Mossetti equation.	UN	1	2
2.	Define Gauss's law.	RE	1	2
3.	Represent the density of energy states in metals.	UN	2	2
4.	Recall the principle of superconducting quantum interference device (SQUID).	RE	2	2
5.	Differentiate direct and indirect band gap semiconductors with examples.	AN	3	2
6.	What is drift velocity?	RE	3	2
7.	Calculate the energy of a photon when the blue LED emits light with a wavelength of 455 nm. Given: Planck's constant, $h=6.626 \times 10^{-34}$ J-s; speed of light, $c=3 \times 10^8$ m/s).	AP	4	2
8.	What is plasmonics in optical materials?	RE	4	2
9.	Mention the significance of Fermi energy in nanomaterials.	AP	5	2
10.	List four properties of carbon nanotubes.	RE	5	2

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

<i>Q.No</i>	<i>Questions</i>	<i>BLT</i>	<i>CO</i>	<i>Marks</i>
11.	a Interpret the electronic, ionic, orientation and space charge polarization mechanisms and hence calculate the total polarization.	UN	1	16
	Or			
	b Illustrate the theory of piezoelectricity, ferroelectricity and pyroelectricity with neat sketch.	UN	1	16
12.	a Define electrical conductivity and derive an expression for electrical and thermal conductivity of metals.	AP	2	16
	Or			
	b Illustrate the properties of dia, para and ferromagnetic materials with examples.	AP	2	16

13.	a	Describe extrinsic semiconductor and derive an expression for the carrier concentration in N-type semiconductor.	AN	3	16
Or					
	b	Define Hall effect and show that the Hall coefficient is positive for P-type semiconductor.	AN	3	16
14.	a i	Infer the theory of optical absorption, emission, charge injection and recombination processes in semiconductors using schematic representations.	UN	4	12
	ii	Infer three types of optical materials based on their interaction with visible light.	UN	4	4
Or					
	b i	Explain the principle, construction and working of light detectors and solar cells.	UN	4	12
	ii	Examine the concept involved in modulators and switching devices.	UN	4	4
15.	a i	Define density of states and explain how it differs in quantum dots, quantum wires and quantum wells with respect to zero, one and two dimensional materials respectively.	AP	5	12
	ii	Explain briefly about the principle of single electron transistor with neat sketch.	AP	5	4
Or					
	b i	Exemplify two spintronic devices and its applications in electronics industry.	AP	5	12
	ii	Infer briefly about quantum well laser with necessary diagram.	AP	5	4