Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

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

First Semester

Common to all Branches

PH3151 / UPHT24103 – Engineering Physics

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.	Define centre of mass of the system.	L1	1	2
2.	The width of a door is 40 cm. If it is released by exerting a force of 2 N at its edge (away from the hinges). Compute the torque produced which causes the door to open.	L3	1	2
3.	Define poynting vector.	L2	2	2
4.	Write short notes on cell phone reception.	L1	2	2
5.	Define progressive wave & standing waves.	L1	3	2
6.	What are the conditions required for laser action?	L1	3	2
7.	How did de-Broglie justify his concept?	L2	4	2
8.	What is meant by correspondence principle?	L2	4	2
9.	Define zero-point energy of a harmonic oscillator.	L1	5	2
10.	Give the note on origin of energy band.	L2	5	2

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

Q.No		*Questions*	*BLT*	*CO*	*Marks*
11.	a	Derive the expression for the rotational kinetic energy and moment of inertia for rigid body in rotation.	L3	1	16
		Or			
	b	Describe the principle, construction and working of gyroscope and also mention its applications in various fields.	L3	1	16
12.	a	Derive Maxwell's equations in differential and integral form.	L3	2	16
		Or			
	b	Obtain the expression for reflection and transmission coefficients of electromagnetic waves normal incident on the interface of non-conductor medium and free space.	L3	2	16

13.	a	i	Explain simple harmonic motion and derive the wave equation for standing waves.	L3	3	8
		ii	Discuss analogy between electrical and mechanical oscillating system.	L2	3	8
			Or			
	b	i	For atomic transitions, derive Einstein's relation and hence deduce the expressions for Einstein's coefficient.	L3	3	12
		ii	Differentiate spontaneous emission and stimulated emission.	L2	3	4
14.	a	i	Derive an expression for the change in wavelength of an X-ray photon when it collides with an electron.	L3	4	12
		ii	Describe the experimental part of the Compton effect.	L3	4	4
			Or			
	b		Apply the Schrodinger wave equation for energy levels enclosed in a one-dimensional potential box of infinite height to obtain Eigen values and the corresponding Eigen function.	L3	4	16
15.	a	i	Explain the principle, construction and working of scanning tunneling microscope with suitable diagram and also mention the advantages, disadvantages and applications.	L3	5	12
		ii	Outline the phenomena of quantum tunneling.	L3	5	4
			Or			
	b		Explain the Kroning-penney model and highlight the salient feature of the model and its applications.	L3	5	16