Reg.No.:												

VIVEKANANDHA COLLEGE OF ENGINEERING FOR WOMEN
[AUTONOMOUS INSTITUTION AFFILIATED TO ANNA UNIVERSITY, CHENNAI]
Elayampalayam – 637 205, Tiruchengode, Namakkal Dt., Tamil Nadu.

Question Paper Code: 30002

B.E. / B.Tech. DEGREE END-SEMESTER EXAMINATIONS – JAN. / FEB. 2026
First Semester
Computer Science and Engineering
U23PH101 – ENGINEERING PHYSICS
(Common to IT, BT, CST and AI & DS)
(Regulation 2023)

Time : Three Hours | Maximum : 100 Marks

Answer ALL the questions

Knowledge Levels (KL)	K1 – Remembering	K3 – Applying	K5 - Evaluating
	K2 – Understanding	K4 – Analyzing	K6 - Creating

PART – A

(10 x 2 = 20 Marks)

Q.No.	Questions	Marks	KL	CO
1.	Define Poisson's ratio.	2	K1	CO1
2.	State Hooke's law.	2	K1	CO1
3.	State the Wiedemann-Franz law.	2	K1	CO2
4.	Write the significance of de Broglie's hypothesis.	2	K2	CO2
5.	Distinguish between substitutional and interstitial impurities.	2	K2	CO3
6.	How is SONAR used to determine the depth of the sea?	2	K2	CO3
7.	Identify the unique structural characteristics responsible for the high strength and corrosion resistance of metallic glasses.	2	K2	CO4
8.	Differentiate between elemental and compound semiconductors.	2	K2	CO4
9.	Why Nitrogen and Helium gases are used in CO_2 laser?	2	K2	CO5
10.	Distinguish between step index and graded index fiber.	2	K2	CO5

PART – B

(5 x 16 = 80 Marks)

Q.No.		Questions	Marks	KL	CO
11.	a)	Describe an experiment to determine the Young's modulus of a material by non-uniform bending. Derive the relevant formula.	16	K2	CO1

(OR)

	b)	With a neat diagram, describe an experiment to determine the coefficient of viscosity of a liquid by Poiseuille's method. Derive the relevant expression.	16	K2	CO1
12.	a)	i. List out the basic assumptions of classical free electron theory. Based on the assumptions derive an expression for electrical and thermal conductivity of metals.	12	K2	CO2
		ii. Calculate the relaxation time of conduction electrons in a metal of resistivity 1.54×10^{-8} Ohm-m. Given the metal has 5.8×10^{28} conduction electrons/m^3.	4		
		(OR)			
	b)	Derive Schrodinger's time independent wave equation and time dependent wave equation.	16	K2	CO2
13.	a)	Prove that the atomic packing factor of face-centered cubic and hexagonal close-packed structures are equal.	16	K1	CO3
		(OR)			
	b)	i. Explain how inverse piezo electric effect can be applied for the production of ultrasonic waves using piezoelectric oscillator.	12	K1	CO3
		ii. A quartz crystal of thickness 1mm is vibrating at resonance. Calculate the fundamental frequency. Density of quartz is 2650 kg/m^3 and its Young's modulus is 7.9×10^{10} Nm^{-2}.	4		
14.	a)	Derive an expression for density of electrons in conduction band and density of holes in valence band of an intrinsic semiconductor. Also arrive expression for intrinsic carrier concentration.	16	K1	CO4
		(OR)			
	b)	Explain the characteristics of Shape Memory Alloys (SMA). Discuss the functions and applications of a NiTi alloy, highlighting the properties that make it suitable for these specific uses.	16	K1	CO4
15.	a)	Explain the terms spontaneous emission and stimulated emission. Discuss Einstein's theory of stimulated emission and obtain the expression for the ratio of the rate of spontaneous to stimulated emission. What are the conclusions drawn from the above expression?	16	K2	CO5
		(OR)			
	b)	Define numerical aperture and derive an expression for numerical aperture and acceptance angle of a fiber in terms of refractive index of core and cladding.	16	K2	CO5