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Question Paper Code : 30078

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

First Semester

Civil Engineering

PH25C01 — APPLIED PHYSICS – I

(Common to : All Branches)

(Regulations 2025)

Time : 3 hours

Maximum : 100 marks

CO – Course Outcomes

CO1	Explain the physics concepts in various applications.
CO2	Apply the principles of wave optics and laser physics in practical systems.
CO3	Analyse the behaviour of materials under different conditions.
CO4	Conduct experiments in groups and interpret the data.

BL – Bloom's Taxonomy Levels

(L1-Remember, L2-Understand, L3-Apply, L4-Analyze, L5-Evaluate, L6-Create)

Answer ALL questions.

PART – A (Total Marks = 40)

[Q. No. 1 to Q. No. 10 ; $10 \times 1 = 10$ Marks (Multiple Choice Questions)]

Q. No. 11 to Q. No. 20; $10 \times 3 = 30$ Marks]

Q.No.	Questions	Marks	CO	BL
1.	The property by virtue of which a body regains its original shape and size after the removal of deforming forces is called (A) Plasticity (B) Ductility (C) Elasticity (D) Brittleness	1	1	1
2.	A beam fixed at one end and loaded at the other is known as a (A) Simply supported beam (B) Cantilever (C) Overhanging beam (D) Fixed beam	1	1	2

3.	Stokes' method for determining viscosity is applicable to (A) High-velocity turbulent flow (B) Small spherical bodies falling through a viscous medium (C) Gases only (D) Non-viscous liquids	1	1	1
4.	In a torsional pendulum, the restoring torque is proportional to the twist angle (θ), the constant of proportionality is called (A) Moment of inertia (B) Shear modulus (C) Angular frequency (D) Couple per unit twist	1	2	2
5.	Damped oscillations are caused by (A) Resistive forces (B) External periodic force (C) Restoring force (D) High acceleration	1	2	2
6.	In a standing wave, the points of maximum displacement are called (A) Nodes (B) Antinodes (C) Harmonics (D) Overtones	1	2	2
7.	Photoelectric effect demonstrated that light has (A) Wave-like properties only (B) Particle-like properties (C) Neither wave nor particle properties (D) Longitudinal nature	1	3	1
8.	The energy levels in a potential box are (A) Continuous (B) Random (C) Quantized (D) Non discrete	1	3	1
9.	The basic components of an optical fiber are (A) Core and Jacket (B) Core and Cladding (C) Cladding and Coating (D) Core, Cladding, and Coating	1	4	2

10.	The Nd:YAG laser is an example of a (A) Gas Laser (B) Liquid Laser (C) Solid-State Laser (D) Semiconductor Laser	1	4	1
11.	Define the terms stress and strain and write down their units.	3	1	1
12.	State Hooke's Law.	3	1	2
13.	Mention the characteristics of SHM.	3	2	2
14.	A quartz crystal of thickness 0.001 meter vibrates in its fundamental frequency. Calculate its frequency. Given that $E = 7.9 \times 10^{10} \text{ N/m}^2$ and $\rho = 2650 \text{ kg/m}^3$ for quartz.	3	2	2
15.	Briefly describe the formation of acoustic grating.	3	2	1
16.	Define black body and write its characteristics.	3	3	1
17.	What is quantum tunneling? Give its significance.	3	3	1
18.	Write a note on interference of light.	3	4	2
19.	State the properties of laser beam.	3	4	2
20.	Distinguish between spontaneous and stimulated emission.	3	4	1

PART – B (5 × 12 = 60 marks)

Q.No.		Questions	Marks	CO	BL
21.	(a)	Discuss with necessary theory, the determination of Young's modulus of elasticity of the material of a beam, supported at its ends and loaded in the middle.	12	1	3
		OR			
	(b)	Give the theory of torsion pendulum and describe a method to find the moment of inertia of the disc.	12	1	3

22.	(a)	Compare and contrast free vibrations, damped vibrations and forced vibrations giving two examples of each.	12	2	3
	OR				
	(b)	Explain with neat sketch, the construction and production of ultrasonic waves using piezoelectric oscillator.	12	2	3
23.	(a)	(i) Arrive at the time independent Schroedinger's wave equation.	8	3	4
		(ii) What are the characteristics of the wave function ψ ?	4	3	4
	OR				
	(b)	(i) Derive Schroedinger equation for a particle in a three dimensional box.	8	3	4
		(ii) Determine the eigen values and eigen functions for the same.	4	3	4
24.	(a)	Demonstrate with theory, the air wedge method of determining the radius of a thin wire.	12	4	3
	OR				
	(b)	Illustrate with figures, construction and the different types of fringes formed in Michelson's interferometer and the corresponding positions of mirrors for them.	12	4	3
25.	(a)	Examine fibre optical communication system with a neat block diagram.	12	4	4
	OR				
	(b)	What are the modes of vibrations of CO ₂ molecule? Describe the construction and working of CO ₂ laser with necessary diagrams.	12	4	4