Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 85034

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2025.

First Semester

Civil Engineering

PH25C01 – APPLIED PHYSICS – I

(Common to : ALL Branches)

(Regulations 2025)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Which is more elastic: Rubber or steel? Why?

2. A steel rod of length 1.5 m is fixed at both ends. Its temperature increases by 60 °C. Given : coefficient of linear expansion $\alpha = 1.2 \times 10^{-5} /\,°C$ and the Young's modulus $E = 2.0 \times 10^{11}$ Pa. Find the thermal stress developed.

3. What are the characteristics of simple harmonic motion?

4. Mention some advantages and disadvantages of damped oscillations.

5. What is the physical meaning of Gauss law of magnetostatics?

6. Compare standing waves with travelling waves.

7. An electron is accelerated by an electric potential of 100 V. Determine its de Broglie wavelength.

8. What is meant by quantum tunneling?

9. What are the conditions for total internal reflection?

10. Is sunlight coherent? Justify your answer.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Obtain an expression for the depression at the free end of a cantilever due to an applied load, whose other end is rigidly fixed.(8)

(ii) A glass sphere of density 2500 kg/m³ and a radius of 1.00 mm falls in oil of density 900 kg/m³ and viscosity η = 0.100 Pa. S. Find the terminal velocity and check the Reynold's number. What do you conclude? (8)

Or

(b) (i) With necessary theory, describe a technique to determine the Young's modulus of a beam by non-uniform bending method. (8)

(ii) A copper square plate has side 0.50 m at 25 °C. It is heated to 125°C. The linear expansion coefficient of copper is 1.7×10^{-5} / °C. Find the fractional increase in area $\Delta A / A_0$ and the new area. (8)

12. (a) Obtain an expression for the couple per unit twist of a torsion pendulum.

Or

(b) With necessary theory, analyze the dynamics of a forced oscillator. Also, discuss any one of its practical applications.

13. (a) Explain in detail, the generation of ultrasonic waves using piezo-electric method.

Or

(b) Discuss in detail, the properties of an electromagnetic wave propagating in free space. Mention the importance of displacement vector.

14. (a) Describe the experiment of photoelectric effect and explain the results using Einstein's theory.

Or

(b) Provide the theory of particle in a one dimensional box with infinite potential, using quantum mechanics. Compare the energy and probability of finding the particle if an electron and a tennis ball of mass 50 g are trapped in a box, when they are moving and when they are stationary.

15. (a) (i) With suitable theory, explain the construction, functioning and applications of Michelson's interferometer. (8)

(ii) A ray in air strikes a glass slab (n = 1.60) at angle i to the normal, refracts into glass, then reaches the opposite glass-air surface. Find the minimum air incident angle so that the second interface (glass-air) has total internal reflection. (8)

Or

(b) (i) Describe the construction, working and applications of CO_2, laser. (8)

(ii) Prove that a two level system cannot have lasing property. (8)

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