Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 21440

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

First Semester

Civil Engineering

PH 3151 – ENGINEERING PHYSICS

(Common to: All Branches)

(Also common to: PTPH 3151 for B.E. (Part-Time) – Regulations 2023)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define torque.

2. What is meant by nonlinear oscillations?

3. Give any four properties of electromagnetic waves.

4. What is meant by radiation pressure?

5. State Doppler effect.

6. Mention any four applications of lasers in various industries.

7. State Compton effect.

8. What is normalization of wave function in quantum mechanics?

9. Define harmonic oscillator.

10. Define quantum tunneling.

PART B — (5 × 16 = 80 marks)

11. (a) Explain in detail the principle, construction, working and applications of gyroscope.

Or

(b) Discuss in detail the rotational energy state of a rigid diatomic molecule.

12. (a) Derive Maxwell's equations in integral and differential form. Explain the terms involved along with the units. Also, give the significance of each of the equations.

Or

(b) Discuss in detail the reflection and transmission of electromagnetic waves from a non-conducting medium.

13. (a) How are standing waves produced? Derive the expression for the wave equation for standing waves.

Or

(b) What are the processes that happen when light interacts with matter? Derive the Einstein's relations for a two energy level system.

14. (a) Derive the expressions for (i) Time independent Schrodinger equation and (ii) Time dependent Schrodinger equation.

Or

(b) Derive the Eigen function and its corresponding Eigen values for a particle in an infinite potential 1D box.

15. (a) Give the principle of Scanning Tunneling Microscope (STM). Explain the construction and working of it.

Or

(b) Discuss the Kronig-Penny model and explain on its basis, the origin of energy bands.