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

Question Paper Code : 91652

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025.

First Semester

Civil Engineering

PH 3151 – ENGINEERING PHYSICS

(Common to : All Branches (Except Marine Engineering))

(Regulations 2021)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Define centre of mass.

2. Write any two applications of gyroscope.

3. What do you mean by radiation pressure?

4. What is meant by polarization?

5. Define Doppler effect in sound.

6. Mention the characteristics of SHM.

7. Write any two significance of a wavefunction.

8. Calculate the de Broglie wavelength of an electron which is accelerated to a potential of 150V. Given $m_e = 9.1 \times 10^{-31}$ kg.

9. When does a resonant tunneling diode behave as a normal diode?

10. Define zero point energy of a harmonic oscillator.

PART B — (5 × 13 = 65 marks)

11. (a) Derive the equations for kinetic energy of system of particles.

Or

(b) What is Torsion pendulum? Derive the equation for rigidity modulus of a thin wire using torsion pendulum.

12. (a) Derive an expression for reflection and transmission coefficients of electromagnetic waves incident normally on the interface of non-conducting medium and free space.

Or

(b) Derive and explain the four Maxwell's equations.

13. (a) Describe the Michelson's Interferometer and explain the formation of the fringes.

Or

(b) Explain the construction and working of CO_2 laser.

14. (a) Define Compton effect. Derive an expression for the wavelength of the scattered photon.

Or

(b) Deduce Schrodinger's time dependent and time independent wave equations.

15. (a) Explain the behavior of an electron moving in a field of periodic potential using Kronig and Penny model.

Or

(b) Describe the principle, construction and working of a scanning tunneling microscope. Write its merits and demerits.

PART C — (1 × 15 = 15 marks)

16. (a) Derive the expressions for energy and wave function of a particle enclosed in a one-dimensional potential box of width 'a' and infinite height.

Or

(b) Describe an experiment to determine the thickness of a thin wire by forming an Air wedge.