Reg. No. : E N G G T R E E . C O M

Question Paper Code : 51502

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2024.

First Semester

Civil Engineering

PH 3151 – ENGINEERING PHYSICS

(Common to All Branches)

(Also common to PTPH 3151 – Engineering Physics for B.E.(Part-time) – First Semester – Civil Engineering/Computer Science and Engineering/Mechanical Engineering/Electrical and Communication Engineering – 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 a torsional pendulum?
3. What do polarized sunglasses do to the light entering your eyes?
4. Write the general electromagnetic wave equation in terms of magnetic field vector in free space.
5. State Doppler effect.
6. Mention any two properties of laser light.
7. State Compton effect.
8. What are Eigen values and Eigen function?
9. What is meant by harmonic oscillator?
10. Why does quantum tunnelling occur?

PART B — (5 × 16 = 80 marks)

11. (a) (i) Find the rotational motion equation around a fixed axis. (8)

(ii) Derive the relation between rotational kinetic energy and moment of inertia. (8)

Or

(b) Include a description of the gyroscope's construction, working, and its uses. (16)

12. (a) (i) Write Maxwell's equations and explain the characteristics of each equation. (8)

(ii) Give a brief explanation on the origin of the electromagnetic waves. In addition, state its properties. (8)

Or

(b) Discuss the path taken by electromagnetic waves when they move from a vacuum to a nonconducting substance. (16)

13. (a) Describe how interference fringes form in an air-wedge-shaped film. How does this procedure calculate the wire thickness? (16)

Or

(b) Describe the CO_2 molecule vibrational modes. Describe the CO_2 lasers design and operation with the appropriate diagrams. (16)

14. (a) (i) Explain the de-Broglie wave (matter wave) theory and use it to derive the wave length equation associated with a moving particle. (8)

(ii) Derive Schrodinger's time dependent wave equation. (8)

Or

(b) Derive an expression for energy levels of a particle enclosed in the 1D infinite potential box of width "a". 16)

15. (a) Derive an expression for the harmonic oscillator's energy levels by using the Schrodinger wave equation. (16)

Or

(b) With the appropriate diagram, describe the resonant diode's construction and operation. (16)