Question Paper Code : 41521

B.E./B.Tech. DEGREE EXAMINATIONS, JANUARY 2022.

First Semester

Civil Engineering

PH 3151 – ENGINEERING PHYSICS

(Common to all Branches)

(Regulations 2021)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the terms : rotational kinetic energy and moment of inertia.

2. The classroom door is of width 50 cm. If the handle of the door is 20 cm from the edge and the force of 5 N is applied on the handle, compute the torque.

3. Write any five properties of electromagnetic waves.

4. Define the term radiation pressure. How do electromagnetic waves have momentum?

5. Define the term Simple harmonic motion.

6. What is spontaneous emission and stimulated emission?

7. What is Compton effect? Compton effect is not observable in the visible region of electromagnetic spectrum, Justify it.

8. What is the meaning of normalization in quantum mechanics?

9. What is quantum tunneling?

10. Give a note on the origin of energy bands.

PART B — (5 × 16 = 80 marks)

11. (a) Explain how the moment of inertia of rigid bodies affects their rotational kinetic energy. (16)

Or

(b) Discuss in detail the concept of conservation of angular momentum. (16)

12. (a) Deduce the Maxwell equations in integral form. Briefly discuss the plane electromagnetic waves in vacuum and condition on the wave field. (16)

Or

(b) Discuss the reflection and transmission of electromagnetic waves from a non conducting medium. (16)

13. (a) (i) State the different analogies between electrical and mechanical oscillating systems and write a brief note on standing and travelling waves. (12)

(ii) Two sound waves from a point source on the ground travel through the ground to a detector. The speed of one wave is 7.5 kms⁻¹, the speed of the other wave is 5.0 kms⁻¹. The waves arrive at the detector 15 s apart. What is the distance from the point source to the detector? (4)

Or

(b) Explain the principle, construction and working of a semiconductor diode laser with necessary diagrams. Mention its characteristics, advantages and applications. (16)

14. (a) Derive Schröndinger equation for a particle in three dimensional box. Determine the eigen values and eigen functions for the same. (16)

Or

(b) Discuss the normalization and probability interpretation of a wave function. (16)

15. (a) Explain the concepts of Barrier penetration and quantum tunneling in detail with necessary sketch. (16)

Or

(b) Write a brief note on Bloch's theorem for particles in a periodic potential and Kronig Penney model. (16)

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