

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code : 12028

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

First Semester

Civil Engineering

PH3151 – 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 Center of mass of a rigid body .
2. What is the difference between force and torque?
3. Define polarization of electromagnetic waves.
4. What is radiation pressure?
5. What are standing waves?
6. Define population inversion.
7. Give the expression for momentum of matter waves.
8. What is meant by normalization in quantum mechanics?
9. Write down the equation of motion of a harmonic oscillator.
10. Give a brief note on Bloch's theorem.

PART B — ($5 \times 16 = 80$ marks)

11. (a) (i) Write down the two theorems of moment of inertia. (6)
(ii) Consider a uniform rod of length "l" and linear mass density " λ ".
(1) Find out its moment of inertia when the rod is rotated about an axis passing through its midpoint and perpendicular to its length. (5)
(2) Find the moment of inertia of the rod when it is rotated about one of its edges. (5)

Or

- (b) (i) Explain the principle of conservation of angular momentum. (6)
(ii) How is the rigidity modulus of a wire measured using torsional pendulum? (5)
(iii) Using the same apparatus how to measure the moment of inertia of a circular disc? (5)
12. (a) Derive the Maxwell's equations when some stationary charges and displaced charges are present in a free space.

Or

- (b) Assume that an electromagnetic wave is incident on an interface between a dielectric material and vacuum at right angles. Describe the reflection and transmission of the wave using necessary equations.
13. (a) (i) Derive the expression for energy transfer of wave. (10)
(ii) Explain how speed of light is measured using an interferometer. (6)

Or

- (b) (i) Describe the principle, construction and working of a Nd-YAG laser. (12)
(ii) List any four applications of lasers in industry. (4)
14. (a) (i) Derive the Schrodinger's equation in time-independent form. (10)
(ii) Explain the properties of a wave function in quantum mechanics. (6)

Or

- (b) Derive the eigen values and eigen vector of a particle confined in a 3D box.

15. (a) (i) Describe the construction and working of a tunneling microscope. (10)
(ii) Explain barrier penetration and tunneling using suitable examples. (6)

Or

- (b) (i) Describe the Kronig-Penny model and discuss its salient outcomes. (10)
(ii) Discuss the origin of energy bands qualitatively. (6)
-

1. The first of these is the fact that the
2. second is the fact that the
3. third is the fact that the
4. fourth is the fact that the
5. fifth is the fact that the
6. sixth is the fact that the
7. seventh is the fact that the
8. eighth is the fact that the
9. ninth is the fact that the
10. tenth is the fact that the