

SAMPLE PAPERS
DIPLOMA FIRST SEMESTER EXAMINATION 2025 (JUT)
ENGINEERING PHYSICS
DIPLOMA WALLAH

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Full Marks: 70 | **Time:** 3 Hours

Instructions:

1. Question No. 1 is **compulsory**.
 2. Answer any **FOUR** questions from the remaining (Q. 2 to Q. 7).
 3. All questions carry equal marks (14 marks each).
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Q. 1. Choose the correct option for the following (Compulsory): [7 × 2 = 14]

(i) The number of significant figures in 0.007 is:

- (a) 1
- (b) 2
- (c) 3
- (d) 4

(ii) The meniscus of water in a glass capillary tube is:

- (a) Convex
- (b) Concave
- (c) Plane
- (d) Irregular

(iii) According to Boyle's Law, at constant temperature, the pressure of a given mass of gas is:

- (a) Directly proportional to its volume
- (b) Inversely proportional to its volume
- (c) Directly proportional to its density
- (d) Both (b) and (c)

(iv) The phenomenon of bending of light around the corners of an obstacle is called:

- (a) Reflection
- (b) Refraction
- (c) Diffraction
- (d) Polarization

(v) The refractive index of a medium is the ratio of the speed of light in vacuum to the speed of light in:

- (a) Water
- (b) Glass
- (c) The medium
- (d) Air

(vi) In X-ray production, the spectrum consisting of a continuous range of wavelengths is called:

- (a) Characteristic X-rays
- (b) Continuous X-rays
- (c) Gamma rays
- (d) Visible spectrum

(vii) Which of the following is a property of a photon?

- (a) It has a charge
- (b) Its rest mass is zero
- (c) It travels slower than light
- (d) It is affected by magnetic fields



Q. 2.

(A) State and explain Newton's three laws of motion. Define momentum and impulse. [7]

(B) Derive the three equations of motion for a body moving with uniform acceleration. [7]

Q. 3.

(A) Define Young's Modulus, Bulk Modulus, and Modulus of Rigidity. State the relation between them. [7]

(B) Define Stress, Strain, and Elastic Limit. Write their S.I. units. [7]

Q. 4.

(A) Explain the variation of acceleration due to gravity ('g') with altitude and depth. [7]

(B) Define unit. Explain fundamental and derived units with two examples of each. [7]

Q. 5.

(A) Describe the construction and working of a He-Ne Laser with a neat diagram. [7]

(B) What is Reverberation? Explain any two methods to reduce reverberation in a hall. [7]

Q. 6.

(A) State the three modes of transmission of heat (Conduction, Convection, Radiation) with examples. [7]

(B) Define and differentiate between longitudinal waves and transverse waves. [7]

Q. 7. Write short notes on any FOUR of the following: [$4 \times 3.5 = 14$]

(A) Capillary Action

(B) Reynolds Number and its significance

(C) Hooke's Law

(D) Dimensional Formula of Universal Gravitational Constant (G)

(E) Terminal Velocity

SOLUTIONS & KEY (PAPER 1)

MCQ Answer Key:

(i) a, (ii) b, (iii) d, (iv) c, (v) c, (vi) b, (vii) b.

Short Answer Solutions:

- **Capillary Action:** The rise or fall of a liquid in a narrow tube (capillary) due to surface tension¹.
- **Reynolds Number:** A dimensionless value used to determine if fluid flow is streamline ($Re < 2000$) or turbulent ($Re > 3000$)².
- **Hooke's Law:** Within the elastic limit, stress is directly proportional to strain³.

Long Answer Model (Q. 2. A):

Newton's 1st Law: A body remains at rest or uniform motion unless acted upon by an external force. 2nd Law: $F = ma$. 3rd Law: To every action, there is an equal and opposite reaction. Momentum ($p = mv$) is the quantity of motion; Impulse ($J = F \times t$) is the change in momentum⁴.