

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: [7 × 2 = 14]

(i) The least count of a standard Vernier Caliper (with 0.1 mm MSD and 10 VSD) is usually:

- (a) 0.1 mm (b) 0.01 mm (c) 0.02 mm (d) 1 mm

(ii) If the percentage error in the measurement of radius is 1%, the error in area will be:

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

(iii) The S.I. unit of the coefficient of viscosity is:

- (a) N/m (b) Pascal (c) Poiseuille (Pa·s) (d) Joule

(iv) At absolute zero temperature, the volume of an ideal gas becomes:

- (a) Infinite (b) Zero (c) Doubled (d) Unchanged

(v) The principle of superposition of waves explains:

- (a) Interference (b) Reflection (c) Refraction (d) Rectilinear propagation

(vi) The energy of a photon is given by the formula:

- (a) $E = mc^2$ (b) $E = hf$ (c) $E = \frac{1}{2}mv^2$ (d) $E = h/\lambda$

(vii) Which type of X-ray spectrum is produced when high-speed electrons knock out inner-shell electrons of the target?

- (a) Continuous (b) Characteristic (c) Gamma (d) Infrared
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Q. 2.

(A) State Newton's Law of Viscosity. Define the coefficient of viscosity and write its S.I. unit. [7]

(B) State Stokes' Law and explain the concept of terminal velocity for a sphere falling in a liquid. [7]

Q. 3.

(A) Explain the construction and working of a Photoelectric Cell with a diagram. [7]

(B) State Einstein's Photoelectric Equation and define the term "Work Function". [7]

Q. 4.

(A) Describe the production of X-rays using a Coolidge tube with a diagram. [7]

(B) List four engineering or medical applications of X-rays. [7]

Q. 5.

(A) State the Law of Thermal Conductivity and define the coefficient of thermal conductivity. [7]

(B) Define Linear, Aerial, and Cubical expansion. Write the relation between their coefficients (α , β , γ). [7]

Q. 6.

(A) Explain the relation between Universal Gravitational Constant (G) and acceleration due to gravity (g). [7]

(B) Why is steel considered more elastic than copper? Explain based on Hooke's Law. [7]

Q. 7. Write short notes on any FOUR: [4 × 3.5 = 14]

(A) Node and Antinode

(B) Wave Velocity Relation ($v = n\lambda$)

(C) Echo and its conditions

(D) Centigrade vs. Kelvin scale

(E) Dimensions of Force and Pressure

SOLUTIONS & KEY (PAPER 2)

MCQ Answer Key:

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

Short Answer Solutions:

- **Node/Antinode:** In stationary waves, nodes are points of zero amplitude; antinodes are points of maximum amplitude⁵.
- **Wave Relation:** Velocity (v) is the product of frequency (n) and wavelength (λ)⁶.
- **Echo:** Reflection of sound heard after a delay; requires a minimum distance of $\sim 17\text{m}$ from the obstacle⁷.

