

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) Which of the following is NOT a fundamental quantity in S.I. system?
(a) Mass (b) Time (c) Velocity (d) Temperature
- (ii) In the stress-strain curve, the point beyond which the material does not return to its original shape is:
(a) Yield point (b) Elastic limit (c) Breaking point (d) Proportionality limit
- (iii) The angle of contact for mercury with glass is:
(a) Acute (b) Obtuse (c) Zero (d) 90 degrees
- (iv) Charles's Law states that at constant pressure, volume is directly proportional to:
(a) Density (b) Absolute Temperature (c) Mass (d) Square of temperature
- (v) The splitting of white light into its constituent colors is known as:
(a) Diffraction (b) Polarization (c) Dispersion (d) Interference
- (vi) In a stationary wave, the distance between a node and its adjacent antinode is:
(a) λ (b) $\lambda/2$ (c) $\lambda/4$ (d) 2λ
- (vii) Minimum wavelength of X-rays depends on:
(a) Nature of target (b) Applied voltage (c) Intensity of filament current (d) None
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Q. 2.

(A) State and explain Newton's Laws of Motion. How is Force related to mass and acceleration? [7]

(B) Derive the relation between Wave Velocity, Frequency, and Wavelength. [7]

Q. 3.

(A) Describe the construction and working of a He-Ne Laser. Why is it called a gas laser? [7]

(B) State the properties of Laser light (Monochromaticity, Coherence, Directionality). [7]

Q. 4.

(A) Explain the variation of 'g' with depth below the Earth's surface. [7]

(B) Define Stress, Strain, and mention the three types of Moduli of Elasticity. [7]

Q. 5.

(A) State and explain Stokes' Law. Discuss the factors affecting terminal velocity. [7]

(B) Explain the significance of Reynolds number in fluid dynamics. [7]

Q. 6.

(A) Discuss the three modes of heat transfer with industrial examples. [7]

(B) Define Fundamental units and Derived units. List any three derived units with their S.I. units. [7]

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

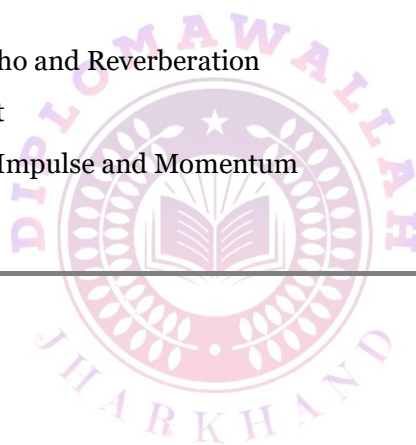
(A) Capillary Rise Formula

(B) Differentiate between Echo and Reverberation

(C) Hooke's Law and its limit

(D) Dimensional formula of Impulse and Momentum

(E) Properties of X-rays



SOLUTIONS & KEY (PAPER 3)

MCQ Answer Key:

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

Short Answer Solutions:

- **Capillary Rise:** $h = \frac{2T \cos \theta}{r \rho g}$. It shows height is inversely proportional to radius⁹.
- **Impulse/Momentum Dimensions:** Both have dimensions $[M L T^{-1}]$ ¹⁰.
- **X-ray Properties:** High penetrating power, travel at the speed of light, ionize gases, affect photographic plates¹¹.

Long Answer Model (Q. 4. A):

As we go deeper into the Earth, the effective mass attracting us decreases, causing 'g' to decrease. At the center of the Earth, $g = 0$ ¹².

