

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER - 2024**

**ENGINEERING PHYSICS-I**

[Maximum Marks: **100**]

[Time: **3 Hours**]

**PART-A**

[Maximum Marks: **10**]

- I. (Answer *all* questions in one or two sentences. Each question carries **2** marks)
1. What are derived quantities? Give any example.
  2. Distinguish between vector and scalar quantities.
  3. State the law of triangle of forces.
  4. State Hooke's law.
  5. Describe the equation of continuity. (5 x 2 = 10)

**PART-B**

[Maximum Marks: **30**]

- II. (Answer *any five* of the following questions. Each question carries **6** marks)
1. Describe the equations of motion under gravity.
  2. Deduce the expression for recoil velocity of gun on the basis of the law of conservation of linear momentum.
  3. Show the components of a vector by its resolution
  4. Illustrate the Poiseuille's experiment to find the rate of flow of a liquid through a capillary tube.
  5. Only odd overtones are possible in a closed pipe - analyze the statement with diagrams.
  6. Describe different applications of Ultrasonic waves.
  7. What is couple? Derive the equation for work done by a couple. (5 x 6 = 30)

**PART-C**

[Maximum Marks: **60**]

(Answer *one* full question from each Unit. Each full question carries **15** marks)

**UNIT – I**

- III. a. Describe the SI units. (3)
- b. Explain Newton's Third law of motion with examples. Illustrate the Third law as a consequence law of conservation of linear momentum. (6)
- c. A body is thrown vertically upwards from the top of a tower with a velocity 19.6 m/s. Find the height of the tower if the stone reaches the foot of the tower after 10 seconds of its projection. (6)

**OR**

- IV. a. What is momentum? How it is related to force? (3)  
b. Deduce the formula for the distance travelled by a body with uniform acceleration during the  $n^{\text{th}}$  second of its motion. (6)  
c. What force will give a mass of 100 kg a velocity of 30m/s in 1minute? (6)

**UNIT – II**

- V. a. Define resultant and equilibrant. (3)  
b. Describe the analytical method to find the resultant of two vectors and discuss different cases. (6)  
c. Two equal forces are acting at a point. They have a resultant of value same as the individual forces. Find the angle between the forces. What force will give a mass of 100 kg a velocity of 30m/s in 1 minute? (6)

**OR**

- VI. a. Describe the Lami's Theorem. (3)  
b. What are the conditions for a body in equilibrium under the action of coplanar parallel forces? Illustrate the conditions with diagram. (6)  
c. Find the couple acting on the shaft of an electric motor when developing a power 2Kw at a speed 1200 revolution per minute. (6)

**UNIT- III**

- VII. a. Describe the terms elasticity, stress and strain. (3)  
b. Describe the Searle's method to determine the Young's modulus of the material of a metal wire. (6)  
c. A spherical ball decreases its volume by 0.01 percent when subjected to a normal pressure of  $10^7 \text{ N/m}^2$ . Find the bulk modulus of the material of the ball. (6)

**OR**

- VIII. a. Describe the three types of energies associated with a fluid. (3)  
b. Discuss the stokes method to determine the coefficient of viscosity of a highly viscous liquid. (6)  
c. A liquid of density  $1250 \text{ kg/m}^3$  flows through a horizontal pipe of varying cross section. The pressure is  $2000 \text{ N/m}^2$  at a position where the velocity is 0.2 m/s. Find the pressure where the velocity is 0.3 m/s. (6)

**UNIT - IV**

- IX. a. Describe Simple harmonic motion with an example. (3)  
b. Projection of a uniform circular motion along a diameter is a simple harmonic motion-Evaluate the statement with sufficient theory. (6)  
c. Determine the fundamental frequency of the sound emitted by a tube of length 45cm, if the tube is a) open at one end and b) open at both ends. Given the velocity of sound in air is 345m/s. (6)

**OR**

- X. a. Briefly explain any method used to produce Ultrasonic waves. (3)  
b. Describe the air column experiment with sufficient theory to find the velocity of sound in air. (6)  
c. What is audible range of frequency? Determine the wave length of sound in air corresponding to the limits of audibility. Given the velocity of sound in air is 348 m/s. (6)

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