

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2020**

**ENGINEERING PHYSICS - I**

[Maximum Marks: 75]

[Time: 2.15 Hours]

**PART-A**

(Answer *any three* questions in one or two sentences. Each question carries 2 marks)

- I. 1. Define derived quantities.  
2. Differentiate scalar and vector quantities.  
3. State triangle law of vector addition.  
4. Define compressibility. What is its unit?  
5. What do you understand by the term “Resonance”? (3 x 2 = 6)

**PART-B**

(Answer *any four* of the following questions. Each question carries 6 marks)

- II 1. Write the equations of motion for a body fall under gravity and against the gravity.  
2. Derive the expression for force from second law.  
3. State Lami’s theorem. How can we determine the mass of a body by Lami’s theorem?  
4. Describe an experimental method to find the young’s modulus of a material.  
5. Explain stokes method to get the equation of viscosity of liquid.  
6. Describe one method of production of ultrasonic waves. Give the application of ultrasonic waves.  
7. Describe the vibration of air column in open pipe. (4 x 6 = 24)

**PART-C**

(Answer *any of the three units* from the following. Each full question carries 15 marks)

**UNIT – I**

- III (a) Define uniform acceleration and give its unit. (3)  
(b) Derive an expression for the displacement of a body in the  $n^{\text{th}}$  second of its motion. (6)  
(c) A body travels 50 m during 3<sup>rd</sup> second and 60 m during 5<sup>th</sup> second of its motion.  
Determine the distance travelled by it in the 7<sup>th</sup> second. (6)

**OR**

- IV (a) Explain Newton's third law of motion with one example. (3)
- (b) Deduce conservation of momentum through the third law of motion. (6)
- (c) A gun of mass 5 kg sends a bullet of mass 0.05 kg with a velocity 500 m/s. Calculate the recoil velocity of gun. (6)

**UNIT – II**

- V (a) Define parallelogram law of vector addition. (3)
- (b) What is resolution of a vector? Explain rectangular resolution of a vector. (6)
- (c) Two equal forces are acting at a point. They have a resultant of value same as individual forces. Find the angle between the forces. (6)

**OR**

- VI (a) Define couple. What happens if the arm of couple increases? (3)
- (b) Derive the expression for work done by a couple. (6)
- (c) Find the couple acting on the shaft of an electric motor when developing a power 3140 Watt at a speed 600 revolutions per minute. (6)

**UNIT- III**

- VII (a) What is elastic limit? Is it same for all materials? (3)
- (b) What are the different moduli of elasticity possible for a material? (6)
- (c) Two identical wires of copper and steel are stretched by the same force. Calculate the ratio of their elongations if the ratio of their Young's modulus is 3:2. (6)

**OR**

- VIII (a) Distinguish between streamline flow and turbulent flow. (3)
- (b) With the help of suitable theory write working of Atomiser. (6)
- (c) A pipeline of varying cross section discharges  $6 \text{ m}^3/\text{s}$ . The diameters are 100 mm and 200 mm. Determine the velocities of the two sections. (6)

**UNIT - IV**

- IX (a) Define simple harmonic motion. Write the differential equation for SHM. (3)
- (b) Prove that the projection of uniform circular motion on a diameter of circle is simple harmonic motion. (6)
- (c) Ultrasonic waves of frequency  $4 \times 10^4$  Hz are propagated through water with a velocity 1400m/s. Calculate the wavelength of these waves in water. (6)

**OR**

- X (a) Distinguish between natural vibration and forced vibration. (3)
- (b) Explain the resonance column experiment to find the velocity of sound in air. (6)
- (c) Determine the fundamental frequency of sound emitted by a tube of length 0.45 m.  
(i) open at one end and (ii) open at both ends. Velocity of sound in air is 345 m/s. (6)

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