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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/
MANAGEMENT/COMMERCIAL PRACTICE, NOVERMBER-2020

ENGINEERING PHYSICS - I

[Maximum marks: 75] (Time: 2.15 Hours)

PART – A

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

1. Distinguish between scalar and vector quantities with examples.
2. State Newton's second law of motion.
3. Define stress and strain.
4. What is meant by flow rate?
5. Distinguish between transverse and longitudinal waves. (3 x 2 = 6)

PART – B

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

1. A body travels 50m during the 3^{rd} second and 60m during the 5^{th} second of its motion. Determine the distance travelled by it in the 7^{th} second.
2. State and prove the law of conservation of linear momentum in the case of two colliding bodies
3. What force will be given to a mass of 100kg initially at rest to get a velocity of 30m/s in 1minute?
4. Derive the expressions for the magnitude and direction of the resultant of two forces by applying parallelogram law.
5. Explain Young's modulus, Bulk modulus and Rigidity modulus of a material.
6. State and prove Bernoulli's principle.
7. Explain six applications of ultrasonics. (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) List down seven fundamental and two supplementary quantities with their SI units. (3)

(b) Define the terms distance and displacement. Derive the formula for the displacement

of a particle during the n^{th} second of its motion when the body is moving with uniform acceleration. (6)

(c) A gun of mass 1000kg free to recoil fires a shot of mass 5kg with a velocity of 100m/s. Find the recoil velocity of the gun (6)

OR

IV. (a) Define the terms inertia, force and momentum (3)

(b) State Newton's third law of motion. Explain the principle of rocket propulsion and recoil of gun (6)

(c) A body of mass10kg moving with a velocity 5m/s makes a collision with another body of mass 5kg coming in the opposite direction with a velocity 2m/s. After collision, if the velocity of the first body is reduced to 2m/s. Calculate the velocity of the other after collision. (6)

UNIT-II

V. (a) State and explain Lami's theorem (3)

(b) Discuss the resultant of like and unlike parallel forces (6)

(c) A couple of 50 Nm acting on a shaft imparts a rotation of 1200 rpm. Determine the power developed. (6)

OR

VI. (a) Explain the triangle method of vector addition. (3)

(b) What is meant by couple? Derive an expression for the work done by a couple (6)

(c) A uniform beam AB balanced at its midpoint C. A weight of 20kg is placed 3m from C. Where should a weight of 30kg be placed to balance it. (6)

UNIT-III

VII.(a) Discuss the variation of viscosity with temperature for gases and liquids (3)

(b) Describe an experiment to find the Young's modulus of a wire (6)

(c) A mass of 4kg produces an extension of 1mm in a wire of length 3m and 1mm in diameter. Calculate the Young's modulus of the material of the wire (6)

OR

VIII. (a) Distinguish between streamline flow and turbulent flow (3)

(b) What is terminal velocity? Using Stocke's formula, obtain an expression for the terminal velocity of a sphere falling through a viscous liquid (6)

(c) Water is flowing through a tapered pipe having radius 75mm and 25mm. If the

velocity of water at the larger section is 3m/s, determine the velocity at the smaller section (6)

UNIT-IV

IX. (a) Define the terms wavelength and frequency of a wave. Derive the relation between velocity, frequency and wavelength (3)

(b) Describe the resonance column experiment to find the velocity of sound (6)

(c) At what temperature will the velocity of sound in air be double its value at 0^0C (6)

OR

X. (a) Define simple harmonic motion. Write its differential equation (3)

(b) Discuss fundamental frequency, frequency of first overtone and frequency of second overtone of vibration of air column in open pipe with diagram (6)

(c) Determine the fundamental frequency of the sound emitted by a tube of length 0.45m, if the tube is (a) open at one end and (b) open at both ends. Velocity of sound in air is 345m/s. (6)

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