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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL - 2025

ENGINEERING PHYSICS - I

[Maximum marks: 100] [Time: 3 Hours]

PART – A
Maximum marks: 10

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

1. What are the supplementary units in SI system?
2. What are scalars and vectors? Give two examples for each.
3. What is meant by stream line flow?
4. State Hooke's law for elastic material.
5. Define wavelength and frequency of a wave. (5 x 2 = 10)

PART – B
Maximum marks: 30

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

1. State the second law of motion. Derive an expression for the force.
2. A train start from rest, moves with uniform acceleration *2 m/s^2* for 5s, then with uniform velocity for 2 minutes and then with uniform retardation of *2 m/s^2* for 4s. Calculate the total distance travelled by the train.
3. The resultant of two vectors acting at an angle 150° is perpendicular to the smaller vector. If the larger vector has magnitude 10 units find the resultant and smaller vector.
4. State and prove Bernoulli's principle.
5. A copper wire 2 m long and 1 mm in diameter is subjected to a tensile force of 125 N. How much will it stretch? The Young's modulus of the copper is $12\text{x}10^{10}\ N/m^2$.
6. Distinguish between transverse and longitudinal wave.
7. Determine the wavelength range of sound in air corresponding to the limits of audibility. The audible range is 20 Hz to 20 kHz. The velocity of sound in air is 348 m/s.

(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) What are the advantages of SI over the other systems? (3)

(b) Obtain an expression for the distance travelled by a particle during the n^{th} second of its motion. (6)

(c) A particle moving with uniform acceleration moves through 19m and 27m in the 5^{th} and 9^{th} second of its motion respectively. Find its initial velocity and acceleration. (6)

OR

IV. (a) Derive an expression for recoil velocity of gun. (3)

(b) State and prove the law of conservation of linear momentum in the case of elastic collision in one dimension. (6)

(c) A force acting on a 2 kg body at rest produces an acceleration of 3 m/s^2. What displacement the same force can be produced on a body of mass 4 kg at rest acting for a time 4s? (6)

UNIT - II

V. (a) A body travels 3m towards south, and then 4m towards east. What is the magnitude of the displacement? (3)

(b) Derive an expression for the resultant of the two forces in magnitude and direction applying parallelogram law. (6)

(c) Determine the torque acting on the shaft of an electric motor developing a power 1 kW at a rotation speed of 1200 rotation per minute. (6)

OR

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

(b) Obtain an expression for the work done by a rotating couple. (6)

(c) A uniform beam XY 20 m long carries weights 25 kg, 40 kg and 50 kg at distances 2m, 4m and 6m respectively from one end X. Weight of the beam is 80 kg. Where should the pivot be placed to balance it? (6)

UNIT - III

VII. (a) Define stress and strain. Give their units. (3)

(b) Derive the equation of continuity. (6)

(c) Water is flowing through a tapered pipe having radius 80 mm and 30 mm. If the velocity of the water at the larger section is 3 m/s, determine the velocity at the smaller section. (6)

OR

VIII. (a) Explain the working principle of an atomiser. (3)

(b) Define the term viscosity. On what factors does the viscous force acting tangentially on a layer depend? Discuss the variation of viscosity of liquids with temperature. (6)

(c) Calculate the viscous force on a water drop of radius 0.1 mm falling through air of coefficient of viscosity $1.8\text{x}10^{-5} Nsm^{-2}$ with constant velocity 0.15 m/s. (6)

UNIT – IV

IX. (a) Derive the relation connecting wave velocity, frequency and wavelength. (3)

(b) What you meant by ultrasonic waves? Explain any one method to produce ultrasonic waves and also give any three application of ultrasonic waves. (6)

(c) Determine the frequency of light of wavelength $700\text{x}10^{-9}\, m$ given velocity of light $3\text{x}10^{8} m/s$. (6)

OR

X. (a) Define Simple Harmonic Motion. Give two examples. (3)

(b) Discuss the resonance column experiment to determine the velocity of sound in air. (6)

(c) Derive an expression for the velocity of the particle executing SHM. (6)
