N23 - 9852

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, NOVEMBER – 2023

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. Give the prefixes of the following multiples, as per the SI.

    (i) 10^3 (ii) 10^{-3} (iii) 10^{-6} (iv) 10^{-2}

2. Give the definitions of *'speed'* and *'velocity'*.

3. What are *'concurrent forces'*?

4. Give the equation of continuity in fluid dynamics.

5. What do you mean by *'ultrasonic waves'*?   (5 x 2 = 10)

PART-B
[Maximum Marks: **30**]

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

1. Differentiate between streamline and turbulent flow.

2. Derive the formula to calculate the distance travelled by a particle during the nth second.

3. A certain particle has a weight of 22 N at a point where acceleration due to gravity,

    $g = 9.8$ m/s^2. What are its **(a)** weight   and **(b)** mass at a point where $g = 4.9$ m/s^2.
    What are its **(c)** weight and **(d)** mass at a point where $g = 0$?

4. Discuss the analytical method to find the magnitude and direction of resultant of two
    forces P and Q acting at an angle θ to each other, using parallelogram law of forces.

5. What is viscosity? Give the variation of coefficient of viscosity of liquids and gases with
    temperature?

6. Discuss the modes of vibrations of an air column in an open pipe, with neat figures.

7. What is the range of frequency of sound audible by human? Calculate the corresponding
    wavelengths to these limits (minimum and maximum) of frequencies. Given that the
    velocity of sound is 340 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. Give the SI units of length and acceleration. What is meant by coherence of SI unit system? (3)

b. Give the three equations of motions? Modify these equations in the case of a freely falling body. (6)

c. A body is travels 20 m during the 7th second and 24 m during the 9th second. Find out the distance travelled during the 15th second? (6)

OR

IV. a. Define *'power'*. Give the formula to find power. What is its SI unit? (3)

b. State Newton's second law of motion? Prove the law. (6)

c. A force of 10 N acts on a mass 2 kg for 5 s. Find out its velocity after 5 s if the body was initially at rest? (6)

UNIT – II

V. a. What is the difference with vector and scalar quantities? Give an example for each. (3)

b. What is equilibrant? Show equilibrant in a neat diagram. State law of triangle of forces. (6)

c. A force 4 N acts along X - direction. Another force makes an angle 60° with the first force. Find the magnitude and direction of resultant? (6)

OR

VI. a. What is a *'couple'*? What is moment of a couple? (3)

b. Derive formula for find the work done by a couple and hence find the power generated if the couple rotates the body N revolutions per unit time? (6)

c. Find the couple acting on the shaft of an electric motor when developing a power 6280 W at a speed of 300 rpm (revolutions per minute). (6)

UNIT- III

VII. a. Define *Young's modulus*. Give its formula. (3)

b. Explain a method for determining Young's modulus of material of a metal wire. (6)

c. Find the elongation of a steel rod of length 3.5 m and radius 2.5 cm when subjected to a load of 5000 kg. (Y of steel is 20 X 10^{10} N/m^2) (6)

OR

VIII. a. What are the energies associated with a flowing liquid? (3)

b. State Bernoulli's theorem in fluid dynamics. Explain any application of this theorem. (6)

c. A sphere of radius 3 mm and density 1600 kg/m^3 falls through a liquid of density 800 kg/m^2 with uniform velocity 5 cm/s. Calculate the coefficient of viscosity of the liquid? (6)

UNIT - IV

IX. a. Define simple harmonic motion? (3)

b. Prove that the projection of a uniform circular motion along a diameter is simple harmonic? (6)

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

OR

X. a. What is resonance? What is the condition for resonance? Give an example? (3)

b. Discuss the modes of vibrations of an air column in an closed pipe, with neat figures. (6)

c. The frequency of the second harmonic in an open pipe is 880 Hz. If the speed of sound in air is 350 m/s find the length of the pipe? (6)

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