TED (15/19) – 1003
(Revision – 2015/19)

N22 - 09617

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE – NOVEMBER – 2022

ENGINEERING PHYSICS – I

(Maximum Marks : 100) (Time : 3 hours)

PART – A
(Maximum Marks : 10)

Marks

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

1. What are the advantages of SI over other unit system.
2. Define the terms resultant and equilibrant.
3. Distinguish between streamline flow and turbulent flow.
4. Define simple harmonic motion and write its differential equation.
5. Derive the relation $v = f\lambda$. (5x2=10)

PART – B
(Maximum Marks : 30)

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

1. State and prove the law of conservation of linear momentum in the case of two colliding bodies.
2. State Newton's second law of motion. Derive the relation F = ma.
3. Define moment of a force about a point. Describe the conditions of equilibrium of a body under the action of coplanar parallel forces.
4. Calculate the power developed when a couple 200Nm rotates a shaft at the rate of 60 revolutions per minute.
5. A spherical body falling in a lake of depth 200m shows a decrease of 0.1% in its volume. What is its bulk modulus?
6. State Bernoulli's principle. Explain the working of spray atomizer using Bernoulli's principle.
7. Show that the projection of a uniform circular motion along a diameter is simple harmonic. (5x6=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 equations of motion of a freely falling body under gravity? (3)

(b) Derive the equation for displacement of a body during the n^{th} second of its motion. (6)

(c) A body moving with uniform acceleration travels 50m in 5 seconds. If it covers 14m during the 5^{th} second, find out the initial velocity and acceleration. (6)

OR

IV. (a) Show that the total change in momentum of a body is equal to the impulse of the force acting on it. (3)

(b) Explain recoil motion of a gun and derive an expression for its recoil velocity. (6)

(c) Calculate the velocity of the bob of an oscillating simple pendulum at its lowest position if it is able to rise to a vertical height of 10cm. (6)

UNIT – II

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

(b) Find out the magnitude and direction of the resultant of two forces **P** and **Q** acting at an angle θ. (6)

(c) At the marks 30cm, 45cm and 86cm of a meter scale of mass 0.5kg, weights 1kg, 2kg and 3kg respectively are suspended. Where the scale should be suspended so that it remains horizontal? (6)

OR

VI. (a) Define the term couple and mention any two characteristics of a couple. (3)

(b) Derive a formula for the work done by a couple. (6)

(c) Two forces whose magnitudes are in the ratio 3:5 give a resultant 35N. If the angle between the forces is 60°, find the magnitudes of the forces. (6)

UNIT –III

VII. (a) Distinguish between elasticity and plasticity. (3)

(b) Describe Searle's method to find the Young's modulus of a wire. (6)

(c) 64 identical droplets of water come down through air with constant terminal velocity 1cm/s. Find the terminal velocity when they combine to form a single drop. (6)

OR

VIII. (a) State and explain the equation of continuity in the case of a fluid flowing through a pipe of varying cross section. (3)

(b) Describe Poiseuille's method to determine the coefficient of viscosity of water. (6)

(c) In a model aeroplane, air streams across wings of area $3m^2$. The flow speeds on the upper and lower surfaces of the wing are 60m/s and 45m/s respectively. Find the lift on the wing. (Density of air is $1.3kg/m^3$). (6)

UNIT – IV

IX. (a) Describe magnetostriction method for the production of ultrasonic waves. (3)

(b) Derive frequency of first, second and third modes of vibration of air in an open pipe. Justify it with diagram. (6)

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

OR

X. (a) Give a few applications of ultrasonic waves. (3)

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

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

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