TED (15) – 1003

(REVISION — 2015)

Reg. No. .....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2019

ENGINEERING PHYSICS - I

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. Define the terms velocity and acceleration.
2. Express kinetic energy in terms of linear momentum.
3. State triangle law of vector addition.
4. What do you mean by elastic fatigue ?
5. Define simple harmonic motion. Give the differential equation for simple harmonic motion. (5×2 = 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. Find out the magnitude and direction of the resultant of two forces P and Q acting at an angle θ by using the law of parallelogram of forces.
3. Explain the method of determination of coefficient of viscosity by Poiseuille's method.
4. Show that only odd harmonics are present in a closed pipe. Illustrate your answer with diagrams.
5. What are energies associated with fluid flow. Write their equations. State Bernoulli's theorem and give the equation.
6. A couple 100 Nm acts on the shaft of a motor and rotates it at a speed of 7 revolutions per second. Calculate the power developed.
7. Calculate the wavelength of sound in air corresponding to the limits of audibility. The audible range is 20 Hz to 20000 Hz. Velocity of sound is 330 m/s.

(5×6 = 30)

Marks

PART — C

(Maximum marks : 60)

(Answer *one* full question from each unit. Each full question carries 15 marks.)

UNIT — I

III (a) Name the seven fundamental quantities and their SI units. 3

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

(c) Give the equations of motion for a body moving up under gravity. A stone is thrown vertically up from a bridge with an initial velocity 4.9 m/s. It strikes the water below the bridge after 2 seconds. What is the height of the bridge above the water level ? 6

OR

IV (a) State Newton's second law of motion. From the law obtain an expression for force. 6

(b) What do you mean by recoil of a gun ? Obtain an expression for the recoil velocity. A bullet of mass 0.025 kg is fired from a gun of mass 5 kg with a speed 500 m/s. Calculate the recoil velocity of the gun. 6

(c) Define impulse of a force and show that it is equal to the change in momentum. 3

UNIT — II

V (a) What are concurrent forces ? State Lami's theorem for concurrent forces. 3

(b) Define the terms resultant and equilibrant of two forces. Give the rectangular components of the force 2N acting at an angle 30° with the horizontal. 6

(c) The resultant of two forces acting at 150° is perpendicular to the smaller force. If the larger force is 3 N, find the smaller force and resultant. 6

OR

VI (a) What are the conditions for equilibrium of a body under coplanar parallel forces. 3

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

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

UNIT — III

VII (a) Define Young's modulus of a material. Give its equation and SI units. 3

(b) A mass of 25 kg is suspended at the free end of a metal wire fixed at the top. The length of the wire is 2m and its radius is 2mm. Find the elongation produced if Young's modulus is $7.5\times10^{10}N/m^2$. 6

(c) Distinguish between streamline flow and turbulent flow. Explain the equation of continuity for streamline flow of a liquid. 6

OR

Marks

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

(b) A sphere of radius 2 mm and density 1600 kg/m^2 falls through a liquid of density 800kg/m^3 with uniform velocity 4 cm/s. Calculate the coefficient of viscosity of the liquid. 6

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

UNIT — IV

IX (a) Give any three characteristics of stationary waves. 3

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

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

OR

X (a) Write a note on free vibration, forced vibration and resonance. 3

(b) What are ultrasonic waves ? Give its two applications. Describe a method to produce ultrasonic waves. 6

(c) The frequency of the second harmonic in an open pipe is 800Hz. If the speed of sound in air is 350m/s, find the length of the pipe. 6