TED (15) – 1003

(REVISION — 2015)

Reg. No. .....

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FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY — OCTOBER, 2015

ENGINEERING PHYSICS - I

(Common to all branches except CABM & DCP)

[*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. Distinguish between distance traveled and displacement.
2. Give two examples each for scalar and vector quantities.
3. What is meant by elastic fatigue ?
4. Period of a simple harmonic oscillator is 2 seconds. Find its frequency.
5. What is end correction as applied to vibration of air column contained in pipes ?

(5×2=10)

PART— B

(Maximum marks : 30)

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

1. (a) Write base units of length, mass, time and temperature in SI. 2
   (b) Why SI units preferred over the other unit systems. 4
2. State law of conservation of linear momentum. Prove law of conservation of linear momentum for collision of particles moving in one dimension using Newton's laws of motion. 6
3. State parallelogram law of vector addition. Derive expressions for magnitude and direction of resultant of two vectors using parallelogram law. 6
4. Explain the terms couple and moment of a couple. Derive the formula for the work done by a couple. 6
5. Define streamline and turbulent flow. Explain different forms of energy associated with a flowing fluid. 6
6. Define modulus of elasticity. Explain various modulii of elasticity. Write their expressions and units. 6
7. Describe a method to produce ultrasonic waves. Give two applications of Ultrasonic waves. 6

Marks

PART— C

(Maximum marks : 60)

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

UNIT—I

III (a) Derive an expression for the distance traveled by a particle in uniform acceleratory motion during n^{th} second of its motion. 4

(b) A body travels 25m during 6^{th} second and 45m during 8^{th} second. Find its initial velocity and acceleration. 4

(c) Write equations of motion for a body projected vertically upwards. 3

(d) Prove that the time of ascent is equal to time of descent for a body projected vertically upwards. 4

OR

IV (a) State Newton's second law and derive the expression F = ma from it. 6

(b) Explain recoil motion of a gun and derive an expression for its recoil velocity. 3

(c) Explain the working of a rocket. 3

(d) A ball weighing 250gm bowled with a speed 40m/s is hit straight by a batsman with a speed 30m/s. What is the impulse of the force exerted by the batsman? 3

UNIT—II

V (a) Define the term resultant and equilibrant. The maximum value of resultant of two forces P and Q is 31N and the minimum value of resultant is 17N. Find the forces. 5

(b) Explain resolution of a vector. Find the rectangular components of a force of 40N makes an angle 30° with the horizontal. 5

(c) State law of triangle of forces. Two forces 3N each act at a point at an angle 90°. A third force acts equally inclined to them keeping the system in equilibrium. Find its value. 5

OR

VI (a) What are coplanar parallel forces ? Write the conditions for equilibrium of a body under the action of coplanar parallel forces. 4

(b) At marks 20cm, 40cm and 80cm of a uniform meter scale of mass 0.5kg, weights 1 kg, 2kg and 2.5 kg respectively are suspended. Where should the scale be suspended so that it remain horizontal. 5

(c) State Lami's theorem and describe a method to determine mass of a body using Lami's theorem. 6

Marks

UNIT—III

VII (a) Explain the principle of continuity for steady and uniform flow of an incompressible fluid. The radius of a water pipe decreases from 2.5cm to 1.5 cm. If the velocity at the wider region is 2.5m/s, calculate the velocity at the narrow region. 5

(b) State Bernoulli's principle and explain the working of an atomizer. 6

(c) A 10kg weight is attached to one end of a copper wire 4m long and diameter 2mm. Find the extension produced if Young's modulus of wire is equal to $1.25\times10^{11}N/m^2$. 4

OR

VIII (a) Define coefficient of viscosity and describe Poiseulle's method to determine coefficient of viscosity of water. 6

(b) Explain Stoke's formula and derive an expression for terminal velocity of a sphere falling through a viscous fluid. 6

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

UNIT—IV

IX (a) Define simple harmonic motion. Give two examples for SHM and write its differential equation. 4

(b) Prove that the projection of uniform circular motion on the axis of the circle is simple harmonic. 6

(c) Define wavelength, frequency and velocity of a wave. Derive the relation between them. 5

OR

X (a) What is resonance ? Discuss resonance column experiment to determine the velocity of sound in air. 6

(b) Discuss with the help of a diagram, the first, second and third modes of vibration of air in a closed pipe. 6

(c) Velocity of sound in air at 30° is 348m/s. Find the velocity at 0°C. 3