TED (15) – 1003

(REVISION — 2015)

Reg. No. .....

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FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY — APRIL, 2017

ENGINEERING PHYSICS – I

(Common to all branches except CABM and DCP)

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

I Answer the following questions in one or two sentences. Each question carries 2 marks.

1. Define derived quantity. Mention the names of any two derived quantities.
2. State triangle law of vector addition.
3. State the term simple harmonic motion. Give two example for simple harmonic motion.
4. The kinetic energy of a body of mass 2 kg is 100J. Calculate its momentum.
5. Define the term stress and strain. Give its unit. (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Define kinetic energy. Show that the relation between kinetic energy and momentum. Two bodies of masses m_1 and m_2 have the same kinetic energy. What is the ratio of their momenta ?
2. Explain the term resolution of a vector. What is rectangular resolution ? A force of 30N makes an angle 30° with the horizontal. Find its horizontal and vertical components.
3. Define stream line flow and turbulent flow. Explain different types of energy associated with a flowing fluid.
4. Define coefficient of viscosity and describe poiseuille's method to determine coefficient viscosity of water.
5. Define wave length, frequency and velocity of a wave. Derive the relation between them.

Marks

6. In a resonance column experiments conducted at 25°C, the first and second resonant lengths were obtained as 16.9cm and 50.6cm respectively. When exited by a tuning fork of frequency 512Hz, calculate the velocity of sound at laboratory temperature and at 0°C.

7. Define the term velocity and acceleration. Derive the equation distance travelled by the particle during n^{th} second of its motion, when the body is moving with uniform acceleration. (5×6 = 30)

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Explain the term recoil of a gun. Write the expression for recoil velocity. 3

(b) A uniformly accelerated body travels 50 mts in 5 seconds. If it covers 14 mts during 5^{th} second, find out initial velocity and acceleration. 6

(c) State Newton's second law and derive the expression for force from it. 6

OR

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

(b) State Newton's third law of motion. Deduce the law of conservation of momentum using Newton's laws of motion. 6

(c) Explain the term work done. Calculate the work done in changing the momentum of a body of mass 10kg from 40 SI units to 20 SI units. 6

UNIT — II

V (a) State the law of parallelogram of forces. Find out the magnitude and direction of the resultant of two forces P and Q acting at an angle θ. Discuss the case for $\theta = 0°, 90°$ and 180°. 6

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

(c) Explain the term couple and what are the characteristics of couple. 3

OR

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

(b) Define the term resultant and equilibrant. The maximum value of resultant of two forces P and Q is 31 N and minimum value of resultant is 17N. Find out the resultant when P and Q Act at right angle. 6

(c) Explain coplanar parallel forces. Two unequal forces act at 120°. The larger force is 80N and the resultant is normal to the smaller. Find the value of the smaller force. 6

Marks

UNIT — III

VII (a) State young's modulus of elasticity. A weight 10kg is suspended to one end of metal wire of length of four metered and radius 1mm. Find young modulus, if the extension produced is 0.998mm. 6

(b) Distinguish between elasticity and plasticity. 3

(c) A rain drop of diameter 0.02mm falls down through air of $\eta = 1.8 \times 10^{-5} kgm^{-1}s^{-1}$. Calculate its terminal velocity, density of water $10kg/m^3$, density of air can be neglected. 6

OR

VIII (a) Explain stokes formula and derive an expression for terminal velocity of a sphere falling through a viscous fluid. 6

(b) Explain equation of continuity in the case of a fluid flowing through a pipe of varying cross section. 3

(c) State Bernoulli's principle. Explain the lift of an aircraft using Bernoulli's principle. 6

UNIT — IV

IX (a) Mention 3 characteristics of stationary waves. 3

(b) What are ultrasonic waves, describe a method to produce ultra sonic waves. 6

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

OR

X (a) Discuss resonance column experiments to determine the velocity of sound in air. 6

(b) Velocity of sound in air at 300K is 346 m/s. At what temperature will the velocity be 405m/s ? 3

(c) Explain the term ultrasonic list application of ultrasonic waves. 6
