TED (15) –1003 Reg. No.....

(REVISION — 2015) Signature .....

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/ TECHNOLOGY — OCTOBER/NOVEMBER, 2016

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. Distinguish between Giga and nano.
2. What do you mean by period in simple harmonic motion ?
3. What is the direction of acceleration of a body when it is thrown vertically upwards and is momentarily at rest at the highest position ?
4. What is elastic limit ?
5. State the triangle method of vector addition. (5×2 = 10)

PART — B

(Maximum marks : 30)

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

1. Write the 3 equations of motion for a body :
   (i) moving upwards under gravity
   (ii) moving downwards under gravity.
2. For a body thrown vertically upwards, prove that time of ascent is same as time of descent.
3. State Newton's first law of motion. Explain its significance.
4. Define parallel forces. What are like and unlike parallel forces ? A force of 30N makes an angle 30° with horizontal. Find its horizontal and vertical components.
5. Explain the different types of energies associated with fluid flow. Write their equations also. Hence, state Bernoulli's theorem and give the equation.
6. Distinguish between free vibrations and forced vibrations. Hence, define resonance.
7. A steel rod of length 4m and 1mm radius is stretched by a 15kg mass. Find the extension produced. Young's modulus of steel is 2×10^{11} N/m^2.

(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) Define displacement, velocity and acceleration. 3

(b) Derive the equation for displacement of a body during the n^{th} second of its motion. A body having initial velocity 10m/s is moving with an acceleration of $2m/s^2$. Find the displacement of the body (i) in the 5^{th} second of motion, (ii) in 5 seconds. 6

(c) A bullet loses $\frac{1}{10}^{th}$ of its velocity when it passes through a wooden block. How many such blocks are required to stop the bullet ? 6

OR

IV (a) Define Inertia. When a moving bus is stopped suddenly, passengers are thrown forward. Why ? 3

(b) Prove the law of conservation of momentum by considering the collision of two bodies moving in a straight line. 6

(c) Explain rocket propulsion. When a gun of 5kg fires a bullet of 200g with a velocity 100m/s, find the recoil velocity of the gun. 6

UNIT — II

V (a) Derive the expression for the magnitude and direction of resultant of two forces using parallelogram law of forces. 6

(b) Two forces 10N and 20N are acting at an angle 60° with the horizontal. Find the magnitude and direction of the resultant force. 6

(c) What are the concurrent forces ? What is the name of the force that brings the body under a set of forces to equilibrium ? 3

OR

VI (a) Explain the resolution of a vector into rectangular components. 3

(b) Two objects are suspended on either ends of a beam 1m long. If a 60kg mass at one end is balanced by a pivot at 0.4m from the same end, find the mass of the other object. 6

(c) Define couple. What is moment of a couple ? Derive an expression for work done by a couple. 6

Marks

UNIT — III

VII (a) Write the equation of continuity for steady and uniform flow of an incompressible fluid with a diagram and explain the terms. The radius of a hose decreases from 2.5cm to 1.5cm. The flow rate of the hose is $10m^3/s$. If water flows through the hose, find its velocities at the two ends. 6

(b) What do you mean by strain ? What are the three types of strain? Write the three corresponding modulii of elasticity. 6

(c) Discuss the working principle of airfoil with a figure. 3

OR

VIII (a) Write the equation for viscous force listing the terms. Describe a method for finding the velocity of liquid using Stoke's method. 6

(b) Discuss the variation of viscosity with temperature. 3

(c) Calculate the terminal velocity of a water drop of radius 0.1mm falling through air of viscocity 1.8×10^{-5} $kgm^{-1}s^{-1}$, if the viscous force on the drop is 5×10^{-11} N. 6

UNIT — IV

IX (a) Define simple harmonic motion. Write its differential equation. 3

(b) Derive a relation connecting the wavelength, frequency and velocity of a wave. Calculat the frequency of blue light of wavelength 430 nanometers. Velocity of light is 3×10^8m/s. 6

(c) What are ultrasonic waves ? Describe a method to produce ultrasonic waves. 6

OR

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

(b) You are given the velocity of sound in air at t°C(v_t). Write an equation to find the velocity of sound at 0°C(v_0). Hence, find the velocity of sound at 0°C, given that velocity of sound at 60°C is 365m/s. 6

(c) Distinguish between nodes and antinodes in wave motion. 3