TED (15) – 1003

(REVISION — 2015)

Reg. No. .....

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2018

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. Write the SI units of electric current and temperature.
2. What are collinear vectors ?
3. Define triangle law of vector addition.
4. State Hooke's law for elastic materials.
5. Give two applications of ultrasonic waves. (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 elastic collision in one dimension.
2. What are the rectangular components of a vector reacting at an angle θ with the X axis ? If one of the rectangular components of a force 40 N is 20 N, find the other component.
3. A mass 5 kg is initially at rest. A force 20 N is applied on it. What is the kinetic energy at the end of 10 s ?
4. Two iron wires of the same radius have lengths in the ratio 1:3. They are subjected to forces in the ratio 2:1. Find the ratio of their elongations.
5. State Bernoulli's principle. Explain the lift of an air craft using Bernoulli's principle.
6. Explain various modes of vibration in an open pipe.
7. Show that the projection of a uniform circular motion along a diameter is simple harmonic. (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) Give the dimensions of velocity and acceleration. A ball is thrown vertically up. What is the velocity and acceleration at the top ? 3

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

(c) A body is thrown vertically up from the top of a cliff with a velocity 98 m/s. It reaches the bottom of the cliff after 22 s. Find the height of the cliff. 6

OR

IV (a) Show that impulse is equal to change in momentum. 3

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

(c) A boy weighing 40 kg jumps upto a height 0.7m. Find his power if he can jump 20 times a minute. 6

UNIT — II

V (a) Define moment of a force. What is its unit ? 3

(b) Obtain an expression for the work done by a rotating couple. 6

(c) A couple 100 Nm acts on the shaft of a motor and rotates it at a speed 7 rev/s. Calculate the power developed. 6

OR

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

(b) What are coplanar forces ? Describe the condition for translational and rotational equilibrium of a body under coplanar parallel forces. 6

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

UNIT — III

VII (a) What are the energies associated with a streamline flow ? 3

(b) Define the term viscosity. On what factors does the viscous force acting tangentially on a layer depend ? Discuss the variation of viscosity of liquids with temperature. 6

(c) Calculate the viscous force on a water drop of radius 0.1mm falling through air of coefficient of viscosity 1.8×10^{-5} kg/m/s with constant velocity 0.15 m/s. 6

OR

Marks

VIII (a) Define stress and strain. Give their units. 3

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

(c) Calculate the pressure required to maintain the flow of a liquid at the rate of 10 litre/s through a horizontal tube 10cm in diameter and 1km in length. Coefficient of viscosity of liquid = 0.001 SI unit. (1 litre = $10^{-3}m^3$) 6

UNIT — IV

IX (a) What is simple harmonic motion ? Give two examples of simple harmonic motion. 3

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

(c) Velocity of sound in air at 0°C is 330 m/s. Find the increase in velocity when the temperature is 1°C. 6

OR

X (a) Describe briefly a method for the production of ultrasonic waves. 3

(b) Distinguish between free vibration and forced vibration. What is resonance ? When does it happen ? 6

(c) The shortest length of an air column contained in a pipe closed at one end and resonating with a tuning fork 384 Hz is 22.1 cm. Calculate the velocity of sound. 6