

TED (15) - 1003

(REVISION - 2015)

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Reg. No.

Signature

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

ENGINEERING PHYSICS - 1

[Time: 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

 $(5 \times 2 = 10)$

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.

PART — B

(Maximum marks : 30)

- II Answer any five of the following questions. Each question carries 6 marks.
 - I. 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.

 $(5 \times 6 = 30)$

[3]

2



Marks

3

6

6

3

6

6

3

6

6

3

6

6

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 ?
 - (b) Obtain an expression for the distance travelled by a particle during the nth second of its motion.
 - (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.

OR

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

- (b) State Newton's second law of motion. From the law obtain an expression for force.
- (c) A boy weighing 40 kg jumps upto a height 0.7m. Find his power if he can jump 20 times a minute.

UNIT — II

V (a) Define moment of a force. What is its unit ?
(b) Obtain an expression for the work done by a rotating couple.
(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.

Or

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

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

UNIT - III

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

- (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.
- (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.



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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} m³) 6 $U_{NIT} - IV$ 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.

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