TED (15)1003 B
(Revision- 2015)

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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/
COMMERCIAL PRACTICE – APRIL -2020.

ENGINEERING PHYSICS-I

(Maximum Marks :75) [Time : 2.15 hours]

PART–A

Marks

I. Answer **any three** questions in one or two sentences. Each question carries 2 marks.

1. What are the merits of the SI system over other unit systems?
2. Describe the triangular method of the addition of two vectors?
3. Distinguish between streamline flow and turbulent flow?
4. Define the term coefficient of viscosity. Write its SI unit?
5. Define simple harmonic motion. (3x2=6)

PART - B

II Answer any **four** of the following questions . Each question carries 6 marks.

1. A force 5N acts on a body of mass 20kg which was initially at rest. Find the distance travelled by the body in 10 s.
2. Explain the recoiling of the gun? Derive the equation for recoil velocity.
3. Explain the moment of force? State the condition for equilibrium under the action of a large number of coplanar parallel force?
4. State Hook's law. Define the three moduli of elasticity?
5. Define the principle of continuity? Derive the equation of continuity?
6. Prove that the projection of uniform circular motion along a diameter is a simple harmonic motion?
7. Define the Ultrasonic waves? Explain two different methods to generate ultrasonic waves?

[4x6 =24]

PART - C

(Answer **any of the three** units from the following. Each full question carries 15 marks)

UNIT I

III (a) Write seven fundamental quantities and their units in the SI system? (3)

(b) State Newton's third law of motion. State and prove the law of conservation of linear momentum in the case of two bodies with mass m_1 and m_2 moving along a line with velocities v_1 and v_2 along a straight line. (6)

(c) A body of mass 40 kg moving with velocity 4 m/s makes an impact with another body of 10kg mass moving in the same direction with velocity 2 m/s. If the velocity of the first mass becomes 3 m/s after the collision, calculate the final velocity of the other? (6)

OR

IV (a) State Work and Power along with their respective units? (3)

(b) Derive the equation for the displacement of a body moving with uniform acceleration during the n^{th} second of its motion? (6)

(c) A body travels 24 m during the 10^{th} second and 34 m during the 15^{th} second of its motion. Find out the distance travelled during the 20^{th} second. (6)

UNIT- II

V (a) Explain the resolution of a vector. (3)

(b) State parallelogram law of vector addition? Explain the analytical method to find out the resultant of two forces P and Q acting at an angle θ. (6)

(c) Let a force 12 N acts on an object along the X-direction and another force 20 N makes an angle 30^0 with the first force. Find out the magnitude and direction of the resultant force. (6)

OR

VI (a) State and explain Lami's theorem? Define the terms Resultant and Equilibrant? (6)

(b) Explain the term couple? Show that the power developed in a rotating body is $2\pi NC$, where N is the number of revolutions per second and C is the moment of the couple. (6)

(c) A couple of 100 Nm acts on the shaft of a motor and rotates it at speed 10 revolutions per second. Calculate the power developed. (3)

UNIT- III

VII (a) Explain the term elastic fatigue. (3)

(b) State Young's modulus. Describe the Searle's method to determine the Young's modulus of a metallic wire. (6)

(c) Find out the elongation of a steel rod of length 5 m and radius 2.5 cm, when subjected to an axial load of 1000 kg. Given Young's modulus of steel is $15x10^{10}$ N/m^2. (6)

OR

VIII (a) State and explain Bernoulli's theorem. (3)

(b) Discuss the term terminal velocity? Using Stokes law obtain an expression for the terminal velocity of a sphere falling through a viscous liquid. (6)

(c) The radius of a water pipe decreases from 4 cm at one end to 2 cm at the other end. If the velocity of water in the wider portion is 2.5 m/s, calculate the velocity at the narrow portion. (6)

UNIT – IV

IX (a) Discuss the resonance column experiment to determine the velocity of sound in the air. (5)

(b) Explain the terms frequency, period, amplitude and phase of a wave. Hence derive an expression for the velocity of a wave in terms of its frequency and wavelength. (6)

(c) Calculate the wavelength of ultrasonic waves of frequency 40000 Hz in the air if they are propagated through the air with a velocity of 330 m/s. (4)

OR

X (a) Describe free vibration, forced vibration and Resonance. (3)

(b) Discuss with the help of a diagram, the different modes of vibrations in a closed pipe? Mention its possible frequencies. (6)

(c) Find out the fundamental frequency of the air column contained in a tube, which is closed at one end and having a length of 80cm and an internal diameter 4 cm. Given the velocity of sound is 330 m/s and the end correction can be taken as 30% of the internal diameter of the tube. (6)

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