TED (15/19) – 1003 **A23 - 06848** Reg.No……..
(Revision – 2015/19) Signature……...

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE , APRIL – 2023

ENGINEERING PHYSICS – I

(Maximum Marks : 100) (Time : 3 hours)

PART – A
(Maximum Marks : 10)

Marks

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

1. What is momentum? Give its unit.
2. State parallelogram law of vector addition.
3. If a pressure of 10^5 Pa can decrease the volume of a gas by 2%, find its bulk modulus.
4. Explain the temperature dependence of velocity of sound.
5. Explain the terms ultrasonic sound and infrasonic sound.

(5x2=10)

PART – B
(Maximum Marks : 30)

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

1. A body of mass 10 kg moving with a velocity of 5m/s collides with another body of mass 8 kg coming with velocity of 3 m/s from opposite direction. If they stick together during the collision, find the velocity with which the system moves after collision.
2. What do you mean by concurrent forces? State and explain the law which is applicable to concurrent forces only.
3. Distinguish between like parallel force and unlike parallel force. Also give the conditions for translational and rotational equilibriums.
4. Define the three different types of moduli of elasticity. Also give their mathematical expressions explaining the terms.
5. The end diameters of a tube are 3 cm and 5 cm. If water enters the tube with a velocity of 20cm/s, find (a) the discharge and (b) the outlet velocity.
6. Prove that uniform circular motion can be viewed as the sum of two mutually perpendicular SHMs.
7. Find the temperature at which the velocity of sound through air becomes double its value of that at 0°C.

(5x6=30)

PART – C

(Maximum Marks : 60)

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

UNIT – I

III. (a) Give any three fundamental quantities and their SI units. (3)

(b) A uniformly accelerated body covers 16m in the 6^{th} second of its motion and 24m in the 10^{th} second of its motion. Find the distance it will travel in the 12^{th} second. (6)

(c) Give the kinematic equations of motion explaining the terms. Also, re write them for motion under gravity, if a body moves (i) up and (ii) down. (6)

OR

IV. (a) State Newton's laws motion. Using the second law, derive the expression for force. (6)

(b) State and prove the law of conservation of momentum in the case of two bodies making elastic collision in one dimension. (6)

(c) A force of 40N acts or 4s on a body of mass 20kg at rest. Find the velocity acquired by the body and the distance travelled. (3)

UNIT – II

V. (a) Distinguish between resultant and equilibrant. How are they related? (3)

(b) Derive the expressions for magnitude and direction of the resultant of two vectors using parallelogram law. (6)

(c) The magnitude of the resultant of two vectors with equal magnitudes is equal to the magnitude of either. Find the angle between the given vectors. (6)

OR

VI. (a) What do you mean by a couple? What is its significance in rotational motion? (3)

(b) Derive the expression for the work done by a couple. Also find the expression for power in terms of frequency of rotation. (6)

(c) A uniform rod has a mass of 2 kg and length 1m. The masses 5 kg, 12 kg and 15 kg are suspended from 20cm, 35cm and 75 cm marks from the left end. Where should a pivot be placed so that the beam remains horizontal? (6)

UNIT –III

VII. (a) Give the expression for different types of energies of a streamline flow, explaining the terms. (3)

(b) State and prove Bernoulli's principle. (6)

(c) 27 identical rain drops fall through air each with terminal velocity 3m/s. If they combine to form a bigger drop, what would be its terminal velocity? (6)

OR

VIII. (a) Briefly explain Poiseuille's methods to find the viscosity of liquids. (3)

(b) Define terminal velocity. Using Stoke's formula for viscosity, find the expression for the terminal velocity of a sphere falling through a viscous fluid. (6)

(c) The end diameters of a pipe are given as 50 cm and 20 cm. The larger section is at a height of 9m from the ground and the smaller section is at a height of 3m from the ground. Water enters the tube through the larger section with a velocity of 1.5 m/s. If the pressure at the larger section is 5.4×10^5 Pa, Find the pressure at the smaller section. (Density of water is 1000 kg/m^3). (6)

UNIT – IV

IX. (a) Define the terms (i) time period (ii) frequency and (iii) amplitude of simple harmonic motion. (3)

(b) Explain the experimental method to find the velocity of sound using resonance column apparatus. (6)

(c) The fundamental frequency of a closed pipe is 500Hz. If it is cut into two equal parts, what are the fundamental frequencies of the resulting pipes? If velocity of sound is 350 m/s, what is the length of the original pipe? (6)

OR

X. (a) Distinguish between transverse waves and longitudinal waves with one example each. (3)

(b) Discuss the formation of standing waves in an open pipe and find the expressions for fundamental frequency and first two overtones. (6)

(c) A particle executes SHM of amplitude 5 cm. At a distance of 3 cm from its mean position, it is found to have an acceleration of 0.48 m/s^2. Determine its time period, frequency and maximum velocity. (6)

****