

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 advantages of SI system over other unit systems?
2. State triangle method for vector addition.
3. Give two examples each for scalar and vector quantities.
4. State Hook's law for elastic materials.
5. Mention any two characteristics of a stationary wave. (3x2=6)

**PART - B**

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

1. Write the 3 equations of motion for a body;  
(i) Moving upwards under gravity. (ii) Moving downwards under gavity.
2. Define the term couple. Derive the formula for work done by a couple.
3. Define the term resultant and equilibrant. The maximum value of resultant of two forces P and Q is 31 N and minimum value of resultant is 17 N. Find the forces.
4. Explain different types of energies associated with fluid flow. Write their equations also. Hence state Bernoulli's principle and give the equation.
5. A metal wire of length 4 m and diameter 2mm is stretched by a mass 8 kg. Find the extension produced if  $Y=11 \times 10^{10} \text{ N/m}^2$ .
6. Explain various modes of vibration in a closed pipe.
7. Velocity of sound in air at  $30^{\circ} \text{ C}$  is 348 m/s. Find the velocity at  $60^{\circ} \text{ C}$ . [4x6 =24]

**PART - C**

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

**UNIT I**

**III** (a) Define displacement, velocity and acceleration. (3)

- (b) State Newton's second law of motion and deduce the expression for force. (6)
- (c) A uniformly accelerated body travels 40 m in the 4<sup>th</sup> second and 60m in the 6<sup>th</sup> second. Find out initial velocity and acceleration. (6)

**OR**

- IV** (a) Define impulse. Give two examples for impulsive force. (3)
- (b) State and prove the law of conservation of linear momentum in the case of elastic collision. (6)
- (c) Explain recoil of a gun. A bullet of mass 25g is fired from a gun of mass 5kg with a speed 500m/s. Calculate the recoil velocity of gun. (6)

**UNIT- II**

- V** (a) State and explain Lami's theorem. (3)
- (b) Derive the expression for the magnitude and direction of resultant of two forces using parallelogram law of forces. (6)
- (c) At the marks 20cm, 40cm and 80cm of a meter scale of mass 0.5 kg weights, 1 kg, 2kg and 3 kg respectively are suspended. Where the scale should be suspended so that it remains horizontal. (6)

**OR**

- VI** (a) Define moment of a force. Give its unit. (3)
- (b) What are coplanar parallel forces? Describe the necessary condition for equilibrium of a body under coplanar parallel forces. (6)
- (c) Find the couple acting on the shaft of an electric motor when developing a Power 6280W at a speed 300 revolutions per minute. (6)

**UNIT- III**

- VII** (a) Explain the term elastic fatigue. (3)
- (b) Explain the principle of continuity for steady and uniform flow of an incompressible fluid. The radius of a water pipe decreases from 2.5 cm to 1.5 cm. If the velocity at the wider portion is 2.5 m/s. Calculate the velocity at the narrow region. (6)
- (c) Give the equation for coefficient of viscosity in terms of the tangential force, velocity gradient and surface area of the liquid. Hence define coefficient of viscosity. (6)

**OR**

- VIII** (a) Discuss the variation of viscosity with temperature. (3)
- (b) What do you mean by strain? What are the three types of strain? Write the three corresponding moduli of elasticity. (6)
- (c) Find the terminal velocity of a rain drop of radius 0.3 mm coefficient of viscosity of air is  $1.83 \times 10^{-5}$  SI unit. Density of water is  $1000 \text{ kg/m}^3$ . (6)

**UNIT – IV**

- IX** (a) Give few applications of ultrasonic waves. (3)
- (b) Distinguish between free vibration, forced vibration and resonance. (6)
- (c) Derive the relation between frequency, wave length and wave velocity.  
Calculate the wave length of ultrasonic waves of frequency 60kHz. Velocity of sound is 340m/s. (6)

**OR**

- X** (a) Define simple harmonic motion. Give two examples. (3)
- (b) What are ultrasonic waves? Describe a method to produce ultrasonic wave. (6)
- (c) The length of a pipe open at both ends is 30 cm. If the speed of sound is 336 m/s. Calculate the fundamental frequency, second harmonic and third harmonic. (6)

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