TED (15) 1003 | A21-08635 | Reg.No.....

(Revision-2015/19) | Signature.....

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/MANAGEMENT/ COMMERCIAL PRACTICE, APRIL-2021

ENGINEERING PHYSICS - I

[Maximum marks: 75] (Time: 2.15 Hours)

PART – A

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

1. State the triangle method of vector addition.
2. Define derived quantity. Write two examples.
3. State Hooke's law for elastic materials.
4. Write the SI units of electric current and luminous intensity.
5. Write the boundary condition for forming a standing wave in a closed pipe. (3 x 2 = 6)

PART – B

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

1. State and Prove law of conservation of linear momentum in the case of two colliding bodies.
2. Explain the term resolution of a vector. What is rectangular resolution? A force of 30N makes an angle 30^0 with the horizontal. Find its horizontal and vertical components.
3. Explain different types of energies associated with fluid flow. Write the equations also. Hence State Bernoulli's theorem and give the equation.
4. Define free vibration, forced vibration and resonance.
5. Define frequency, wavelength and velocity of wave. Derive the relation between them.
6. A steel rod of length 4m and 1mm radius is stretched by a 15kg mass. Find the extension produced. Young's modulus of steel is $2x10^{11}N/m^2$.
7. A couple 100Nm acts on a shaft of a motor and rotates it at a speed of 7 revolutions/second, Calculate the power developed (4 x 6= 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) Derive the equation of displacement of a body during n^{th} second of its motion. A body having initial velocity 10m/s is moving with an acceleration 2m/s. Find the displacement of the body (i) In the 5^{th} second of its motion (ii) In 5 seconds. (6)

(c) State Newton's second law and derive the expression for force from it (6)

OR

IV. (a) Define impulse of a force and show that it is equal to change in momentum. (3)

(b) What do you mean by recoil velocity? Obtain the expression for recoil velocity. A bullet of mass 0.025kg is fired from a gun of mass 5kg with a speed 500m/s. Calculate the recoil velocity of gun. (6)

(c) Prove that time of ascent is equal to time of descent for a body projected vertically up. (6)

UNIT-II

V. (a) What are concurrent forces? State Lami's theorem for concurrent forces. (3)

(b) State parallelogram law of forces. find the magnitude and direction of the resultant of two forces P and Q acting at an angle θ (6)

(c) The resultant of two forces acting at an angle 120^0 is perpendicular to the smaller force. If the larger force is 100N, find the smaller force and resultant. (6)

OR

VI. (a) What are the conditions for equilibrium of a body under coplanar parallel forces. (3)

(b) Explain the term couple. Derive the formula for work done by the couple. (6)

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

UNIT-III

VII.(a) Define Young's modulus of the material. Give its equation and SI unit. (3)

(b) Distinguish between stream line flow and turbulent flow. Explain the equation of continuity for steam line flow of liquid. (6)

(c) The radius of a water pipe decreases from 2.5cm to 1.9cm. If the velocity of water in the wider portion is 2m/s, calculate the velocity at narrow portion. (6)

OR

VIII. (a) Discuss the variation of viscosity with temperature. (3)

(b) Write Poiseuille's formula for the flow of liquid through capillary tube. Describe Poiseuille's method to determine the coefficient of viscosity of water. (6)

(c) Calculate the terminal velocity of water drop of radius 0.1mm falling through air of viscosity $1.8x10^{-5}kgm^{-1}s^{-1}$, if the viscous force on the drop is $5x10^{-11}N$. (6)

UNIT-IV

IX. (a) Explain 3characteristics of stationary waves. (3)

(b) Explain the term ultrasonic. List any four applications of ultrasonic waves. (6)

(c) Prove that projection of uniform circular motion on the axis of the circle is simple harmonic. (6)

OR

X. (a) Calculate the frequency of blue light of wavelength 430nm. Velocity of light is $3x10^{8}m/s$ (3)

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

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

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