TED (15) – 1003

(REVISION — 2015)

Reg. No. .....

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FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY — MARCH, 2016

ENGINEERING PHYSICS – I

(Common to all branches except CABM and DCP)

[*Time* : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. What are the advantages of SI over all other unit systems ?
2. Define the terms resultant and equilibrant of two forces.
3. Distinguish between stress and strain. Give their units.
4. What is meant by resonance ?
5. Define simple harmonic motion. Give two examples for simple harmonic motion. (5×2 = 10)

PART— B

(Maximum marks : 30)

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

1. State the law of motion that helps us to measure force. Define force and explain how force is measured ?
2. Give an example to illustrate the third law. Explain the principle of rocket propulsion and recoil of a gun.
3. What is meant by resolution of a vector ? What is rectangular resolution ? Give two rectangular components of force 4N acting at an angle 30° to the horizontal.
4. The largest resultant of two forces P and Q is 31N and the least resultant is 17N. What is the resultant if P and Q act at right angles ?
5. Describe an experiment to find the Young's modulus of a wire.
6. The volume of a metal sphere of radius 7cm is decreased by 0.019 centimeter cube when subjected to a pressure of 124 kN/m^3. Find out its bulk modulus.
7. Derive the expression for the fundamental frequency and second harmonic in an open pipe of length L. (5×6 = 30)

Marks

PART— C

(Maximum marks : 60)

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

UNIT – I

III (a) Write the equations of motion of a body moving under gravity. 3

(b) Define the terms velocity and acceleration. Dérive the formula for the distance travelled by a particle during the n^{th} second of its motion, when the body is moving with uniform acceleration. 6

(c) A body of mass 10^3 kg at rest is acted on by a force 200N. How much time is required for the body to acquire a velocity 20m/s. 6

OR

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

(b) State Newton's third law of motion. Deduce the law of conservation of momentum using Newton's laws of motion. 6

(c) A uniformly accelerated body travels 20m during the 7^{th} second and 24m during the 9^{th} second. Find out the distance travelled during the 15^{th} second of its motion. 6

UNIT – II

V (a) State and explain Lami's theorem. 3

(b) State the law of parallelogram of forces. Find out the magnitude and direction of the resultant of two forces P and Q acting at an angle θ. Discuss the cases for $\theta = 0°$, $90°$ and $180°$. 6

(c) The resultant of two unequal forces acting at $150°$ is perpendicular to the smaller force. If the larger force is 3N, find the smaller force and resultant. 6

OR

VI (a) Define the term moment of a force about a point. State the conditions of equilibrium of a body under the action of coplanar parallel forces. 3

(b) Derive a formula for the work done by a couple. Calculate the work done in one second when a couple 200Nm rotates a shaft at the rate 60 revolutions per minute. 6

(c) At the marks 30cm, 45cm and 80cm 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

Marks

UNIT – III

VII (a) State Hooke's law. Explain the term elastic fatigue. 3

(b) What is terminal velocity ? Using stokes law, obtain an expression for the terminal velocity of a sphere falling through a viscous liquid. 6

(c) A capillary tube of length 0.20m and radius 0.5mm is fitted horizontally to the bottom of a large vessel containing a liquid of density 800 kg/m^3. The tube is 0.30m below the surface of the liquid. If the coefficient of viscosity of the liquid is 0.0012 $kgm^{-1}s^{-1}$, find the mass of the liquid flowing out in 5 minutes. 6

OR

VIII (a) Explain the equation of continuity in the case of a fluid flowing through a pipe of varying cross-section. 3

(b) State Bernoullis principle. Explain the lift of an air craft using Bernoullis principle. 6

(c) In a model aeroplane, air streams across the wing of area $3m^2$. The flow speeds on the upper and lower surfaces of the wing are 60 m/s and 45 m/s respectively. Find the lift on the wing. Density of air is 1.3 kg/m^3. 6

UNIT – IV

IX (a) What is ultrasonics ? Give few applications of ultrasonics. 3

(b) Explain the terms frequency, period, amplitude and phase of a wave. Derive an expression for the velocity of a wave. 6

(c) A pipe of length 18cm is closed at one end. Find out the lowest frequency of a tuning fork which will vibrate in unison with the air column. Velocity of sound in air is 345.6 m/s. 6

OR

X (a) What is end correction as applied to vibration of air column contained in a pipe ? 3

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

(c) In a resonance column experiment the first and second resonance lengths were 17.6cm and 53.2cm when excited by a tuning fork of frequency 484Hz. If the laboratory temperature was 25°C, calculate the velocity of sound in air. 6
