TED (10) – 1003 A

(REVISION — 2010)

DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

APPLIED SCIENCE — I (Physics)

[*Time* : 1½ hours

(Maximum marks : 50)

PART — A

(Maximum marks : 4)

Marks

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

(a) Write the dimensional formula of pressure and coefficient of viscosity.

(b) Define Centre of Gravity. $(2 \times 2 = 4)$

PART — B

(Maximum marks : 16)

(Answer any *two* questions. Each full question carries 8 marks.)

II (a) Derive an expression for the period of a simple pendulum using dimensional analysis.   4

   (b) State the law of conservation of momentum. Prove it in the case of collision of two bodies moving in the same direction.   4

III (a) Derive the equation for the displacement of a uniformly accelerated body during the nth second of its motion.   4

    (b) State and explain parallel and perpendicular axes theorems.   4

IV (a) Derive an expression for the kinetic energy of a rolling disc.   4

   (b) Distinguish between stress and strain. Deduce the expression for Young's modulus.   4

[85]   [P.T.O.

Marks

PART — C

(Maximum marks : 30)

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

Unit — I

V (a) What is impulse ? Show that impulse is equal to change in momentum. 3

   (b) For a body projected upwards, derive an expression for

      (i) the maximum height reached   (ii) horizontal range. 6

   (c) A stone of mass 0.1 kg tied to the end of a string of length 0.2m is whirled in a horizontal circle with an angular velocity 2 rad/second. Find the linear velocity, centripetal acceleration and centripetal force. 6

Or

VI (a) Write advantages of SI system over other systems of unit. 3

   (b) A machine gun of mass 10 kg fires 30 gm bullets at the rate of 6 bullets per second, each with velocity 400 m/s. Find the recoil velocity of the gun and what force must be applied to keep the gun in position ? 6

   (c) A boy can throw a ball 40 m vertically upwards. Find the greatest distance he can throw. 6

Unit — II

VII (a) State and explain Newton's law of gravitation. 3

   (b) A circular disc of mass 300 kg and diameter 4 m rotates with an angular velocity of 90 rpm. When a torque is applied, its velocity is reduced to 60 rpm in 30 seconds. Find the value of the torque. 6

   (c) Deduce expressions for Young's modulus, Rigidity modulus and Bulk modulus. 6

Or

VIII (a) Define radius of gyration. Give its unit. 3

   (b) Deduce an expression for the orbital velocity of a satellite. What will be the velocity of the satellite, if its orbit is close to the surface of earth ? 6

   (c) A steel wire of length 4.7m and cross section $3.5 \times 10^{-5} m^2$ stretches by the same amount as a copper wire of length 3.5 m and cross section $4 \times 10^{-5} m^2$ under a given load. What is the ratio of Young's modulus of steel to that of copper ? 6