

**DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/  
MANAGEMENT/COMMERCIAL PRACTICE — APRIL, 2018**

**APPLIED SCIENCE - I (Physics)**

[Time : 1½ hours

(Maximum marks : 50)

PART — A

(Maximum marks : 4)

Marks

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

- (a) Obtain the dimensional formula for work and power.
- (b) Define universal gravitational constant. Write an expression for it. (2×2 = 4)

PART — B

(Maximum marks : 16)

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

- II (a) Derive an expression for distance travelled by a particle during  $n^{\text{th}}$  second of its motion. 4
- (b) What is friction ? Write any two causes of friction. 4
- III (a) Write Newton's second law of motion. From second law, derive the equation,  $F = ma$  4
- (b) State and explain parallel and perpendicular axes theorems. 4
- IV (a) Obtain an expression for moment of inertia of a disc about an axis passing through the centre and perpendicular to its plane. 4
- (b) Two identical wires of steel and copper are stretched by the same weight. Calculate the ratio of their extensions if the ratio of their Young's modulus is 5:3. 4

## PART — C

(Maximum marks : 30)

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

## UNIT — I

- V (a) What is a derived quantity ? Mention the names and the dimensional formula of any three derived quantities. 3
- (b) A bullet strikes a uniform plank with a velocity 400 m/s and comes out with half of that velocity. What would be the velocity of the out coming bullet if the plank were only half thick. 6
- (c) Obtain expressions for maximum height and time of flight of a body projected at an angle  $\theta$  to the horizontal with velocity 'u'. 6

OR

- VI (a) Define impulse of a force and show that it is equal to change in momentum. 3
- (b) From Newton's third law of motion, derive law of conservation of momentum. 6
- (c) A bullet of mass 0.03kg is shot from a gun with a velocity 300 m/s. Find the mass of the gun, if the recoil velocity is 0.6 m/s. 6

## UNIT — II

- VII (a) Define radius of gyration. 3
- (b) A circular disc of mass 1 kg has radius 0.5 m. It rotates in a horizontal plane about an axis passing vertically through the centre. If the disc makes 10 revolutions in 5 seconds, determine the rotational kinetic energy. 6
- (c) Derive an expression for orbital velocity of a satellite. 6

OR

- VIII (a) What are geostationary satellites. 3
- (b) Calculate the acceleration due to gravity on the surface of the earth if the Universal gravitational constant,  $G = 6.67 \times 10^{-11}$  SI unit, mass of the earth,  $M = 6 \times 10^{24}$  kg. 6
- (c) State Hooke's law. Define and explain the three moduli of elasticity. 6