

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY —
MARCH, 2014

APPLIED SCIENCE-I (Physics)

(Common except DCP and CABM)

[Time : 1½ hours

(Maximum marks : 50)

PART—A

(Maximum marks : 4)

Marks

- I Answer the following questions in one or two sentences. Each question carries 2 marks.
- (a) Write down the dimensional formula for power. 2
- (b) State Hooke's law. 2
- (2×2=4)

PART—B

(Maximum marks : 16)

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

- II (a) When a body is thrown up, show that the time of ascent is equal to the time of descent. 4
- (b) Derive kinetic energy of a disc rolling on a horizontal surface. 4
- III (a) Illustrate centripetal force in banking of curves. 4
- (b) Derive an expression for orbital velocity of a satellite. 4
- IV (a) What is impulse? Calculate the impulse required to stop a car of mass 2000 kg moving with speed of 30 m/s. 4
- (b) State and explain parallel and perpendicular axes theorem. 4
- (2×8=16)

PART—C

(Maximum marks : 30)

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

UNIT—I

- V (a) Coefficient of viscosity of water in SI is 10^{-3} . Find its value in CGS unit using dimensional analysis 3
- (b) Obtain an expression for maximum range for a body projected with a velocity 'u'. What will be its maximum range when the velocity is doubled? 6

- (c) A neutron having a mass of 1.67×10^{-27} kg and moving at 10^8 ms⁻¹ collides with a deuteron at rest and sticks to it. Calculate the speed of the combination. [mass of deuteron = 3.34×10^{-27} kg.].

6

OR

- VI (a) Sand is thrown on tracks covered with snow in hilly areas. Why? 3
- (b) Prove the law of conservation of momentum from Newton's second and third laws. 6
- (c) A body moving with uniform acceleration describes 10 m in the 2nd second and 20 m in the fourth second of its motion. Calculate the distance moved by it in the fifth second. 6

UNIT—II

- VII (a) Explain the term 'elastic fatigue'. 3
- (b) What do you understand by geostationary satellites? Deduce the value of its height above the surface of the earth in kilometer. [Radius of earth = 6400 km; and 'g' of earth = 9.8 ms⁻²]. 6
- (c) 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 30s. Find the value of the torque. 6

OR

- VIII (a) Distinguish between 'g' and 'G'. 3
- (b) Derive an expression for the moment of inertia of a uniform circular disc about an axis passing through its centre and perpendicular to its plane. 6
- (c) A steel wire of length 4.7 m and area of cross section 3×10^{-5} m² stretches by the same amount as a copper wire of length 3.5 m and area of cross section 4×10^{-5} m² under a given load. What is the ratio of Young's Modulus of steel to that of copper? 6