

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY
MARCH, 2011

APPLIED SCIENCE-I
(Common—except DCP and CABM)

{Time : 3 hours

(Maximum marks : 100)

[Note :— Section I-Physics and section II-Chemistry to be answered in separate answer books.]

SECTION-I

Physics

(Maximum marks : 50)

PART—A

(Marks : 4)

(Answer the questions in one or two sentences. Each carries 2 marks)

Marks

- I (a) Write the advantages of SI system over other systems of unit.
- (b) Define angular momentum. Give the relation between torque and angular momentum. (2×2=4)

PART—B

(Marks : 16)

(Answer any two full questions. Each carries 2 marks)

- II (a) 'A body projected vertically will reach the same point with the same magnitude of velocity'. Justify this statement and find the time of flight. 4
- (b) Define uniform circular motion. 'Can a body move with uniform velocity along a circular path'. Give reason. 4
- III (a) Starting from Newton's second law, verify the relation $F=ma$. 4
- (b) Compare linear KE and rotational KE. Prove that for a body rotating with unit angular velocity its moment of inertia is equal to twice its rotational KE. 4
- IV (a) State and explain parallel and perpendicular axes theorems. 4
- (b) Distinguish between stress and strain. Deduce the expression for bulk modulus. 4
- (2×8=16)

PART—C
(Marks : 30)

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

UNIT—I

- V (a) Define impulse. Give its unit. 3
- (b) A football is kicked with a velocity 'u' at an angle 'θ' with the horizontal. Derive the equation for maximum height and horizontal distance travelled by the ball. 6
- (c) A body travels 25 m during 6th second and 30 m during 8th second. Find out the distance travelled during 15th second. 6

OR

- VI (a) Write the applications of dimensional method. 3
- (b) Derive the expression for period of a simple pendulum. 6
- (c) A stone of mass 0.1 kg tied to the end of a string of length 0.2 m is whirled in a horizontal circle with an angular velocity 2 rad/s. Find the linear velocity, centripetal acceleration and centripetal force. 6

UNIT—II

- VII (a) Define radius of gyration. Give its equation and unit. 3
- (b) A disc of mass 'M' and radius 'R' is rotating about an axis passing through its centre and perpendicular to its plane. Derive the expression for the moment of inertia of the disc. 6
- (c) Calculate the period of a satellite rotating at a height 36000 km from the surface of the earth if mass of earth is 6×10^{24} kg and radius is 6370 km. ($G = 6.67 \times 10^{-11} \text{ Nm}^2 \text{ kg}^{-2}$). 6

OR

- VIII (a) Explain the concept of Geostationary satellites. 3
- (b) State Newton's law of gravitation. Derive the expression for orbital velocity of a satellite. 6
- (c) A mass of 50 kg is suspended from the end of a wire of length 100 cm and diameter 2 mm. Calculate the elongation of the wire if the young's modulus of the wire is $12.5 \times 10^{10} \text{ Nm}^{-2}$. Compute the elongation of the wire if the mass is replaced by 100 kg. 6

(2×15=30)