

S<sub>1</sub> - ME, PL, AR

TED (10) – 1003A

Reg. No. ....

(REVISION —2010)

Signature .....

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/  
TECHNOLOGY — MARCH, 2015

**APPLIED SCIENCE – I (PHYSICS)**

(Common except DCP and CABM)

[Time : 1½ hours

(Maximum marks : 50)

**PART-A**

(Maximum marks : 4)

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

Marks

I (a) Distinguish between fundamental and derived quantities.

(b) What is meant by elastic limit ?

(2×2=4)

**PART- B**

(Maximum marks : 16)

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

II (a) What does banking of curved tracks mean ? Explain the theory behind banking.

4

(b) A bullet weighing 40gm is fired from a gun of mass 8kg, with a velocity 400m/s. Find the recoil velocity of the gun. Also calculate the force which will stop the gun in 1 second.

4

III (a) State Newton's second law of motion. Hence deduce an expression for force.

4

(b) Explain rotational kinetic energy. Derive expression for kinetic energy of a rolling disc.

4

IV (a) Define radius of gyration. What is its value for a uniform circular disc of mass M and radius R, if the disc is rotating about an axis passing through the centre and perpendicular to its plane ?

4

(b) State Hooke's law. Define the three modulus of elasticity.

4



## PART – C

(Maximum marks : 30)

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

## UNIT – I

- V (a) In a uniform circular motion, speed is kept constant, but velocity is not constant. Explain. 3
- (b) Derive an expression for the maximum height of a projectile. “When the horizontal range is maximum, largest height attained by a projectile is one fourth of the maximum range”. Justify. 6
- (c) A bullet of mass 20gm is fired with a velocity of 100m/s into a wooden block of mass 0.2kg placed on a frictionless horizontal surface. If the bullet is embedded into the wooden block, calculate the common velocity of the bullet and the wooden block. 6

OR

- VI (a) Write any three methods to reduce friction. 3
- (b) Derive an expression for the period of a simple pendulum using dimensional analysis. 6
- (c) A body travels 150m during the 5<sup>th</sup> second and 90m during the 9<sup>th</sup> second of its motion. Determine the distance travelled by it in the 12<sup>th</sup> second. 6

## UNIT – II

- VII (a) Define universal gravitational constant. Write its dimensional formula. 3
- (b) State and explain parallel axes and perpendicular axes theorems. Using appropriate theorem, determine the moment of inertia of a uniform circular disc about a diameter. 6
- (c) Define the term, period of revolution of a satellite. An artificial satellite revolves round the earth at a height 6600km from the surface of earth. Calculate its period of revolution. (Radius of the earth = 6400km; gravitational constant,  $G = 6.67 \times 10^{-11} \text{ Nm}^2\text{kg}^{-2}$ ; mass of the earth =  $6 \times 10^{24} \text{ kg}$ ). 6

OR

- VIII (a) Define torque. Write the relation between torque and angular momentum. 3
- (b) What are geostationary satellites? Deduce its orbital velocity. (Acceleration due to gravity,  $g = 9.8\text{m/s}^2$ ; Radius of the earth = 6400km;  $h = 36000\text{km}$ ) 6
- (c) A metal wire of length 1.6m has a diameter 2mm. If it produces an elongation of 3mm under a given load, calculate the tension in the wire. (Young's modulus of the material of the wire =  $2 \times 10^{11}\text{N/m}^2$ ). 6