TED (10)–1003 A

(REVISION—2010)

Reg. No. ....

Signature ....

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY—
OCTOBER, 2013

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) What are nano and femto ?

(b) Give the relation between angular momentum and angular velocity.   (2×2=4)

PART—B

(Maximum marks : 16)

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

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

   (b) Derive an expression for acceleration due to gravity.   4

III (a) Obtain an expression for the period of a simple pendulum using dimensions.   4

   (b) Define torque and angular momentum and give the relation between them.   4

IV (a) Can a body possess zero velocity and still accelerate. Give example.   4

   (b) Explain Young's Modulus, Bulk Modulus and Rigidity Modulus of a material.   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) State Newton's second law of motion. Hence derive the equation for force.   3

   (b) Define recoil of a gun. Applying law of conservation of momentum, obtain an
       expression for recoil velocity.   6

(c) A stone is dropped into water from a bridge 44.1 m above the water level. Another stone is thrown vertically downward one second later. Both stones reach water surface simultaneously. Find the initial downward velocity of the second stone. [g = 9.8 ms^{-2}].   6

<div align="center">Or</div>

VI   (a) Why wheels are made circular ?   3

   (b) Derive an expression for :

    (i) the maximum height reached and

    (ii) horizontal range in the case of a body projected upwards   6

   (c) A train moves around a bend of radius 100 m with a speed of 72 kmph. Calculate the angle of banking and find the height of outer rail over inner rail if the distance between the rails is 1.52 m.   6

<div align="center">Unit—II</div>

VII   (a) Distinguish between deforming force and restoring force.   3

   (b) Derive an expression for moment of inertia of a uniform circular disc about an axis passing through its centre and perpendicular to its plane.   6

   (c) Calculate the orbital velocity required to maintain a satellite in circular orbit at 160 km above earth. Radius of earth is 6400 km and acceleration due to gravity at this height is 9.8 ms^{-2}. Also find the time period of the satellite.   6

<div align="center">Or</div>

VIII   (a) What is the difference between ordinary and geostationary satellite ?   3

   (b) The distance of moon from earth is 3.8×10^5 km and its mass is 7.36×10^{22} kg. Find the angular momentum of the moon about the earth. The angular velocity of moon around earth is 6.46×10^{-5} rad/s.   6

   (c) The diameter of a brass rod is 6 mm. What force in newton will stretch by 0.2% of its length ? [Y = 9×10^{10} Nm^{-2}].   6

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—OCTOBER, 2013

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

[*Time* : 1½ hours

(Maximum marks : 50)

Marks

PART—A
(Maximum marks : 4)

I   Answer the following questions in one or two sentences. Each question carries 2 marks.

(a)   Explain neutralization reaction. Give one example.

(b)   Define soft water.

(2×2=4)

PART—B
(Maximum marks : 16)

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

(a)   Magnesium metal burns in oxygen to form magnesium oxide (MgO) as per the equation : $Mg + O_2 \rightarrow MgO$.

How many grams of oxygen are needed to react with 25 g of magnesium ? How many grams of magnesium oxide will result ?   4

(b)   Explain the electronic concept of oxidation and reduction. Give one example.   4

III   (a)   What are buffer solutions ? Give two examples.   4

(b)   What are carbon nanotubes ? Explain the structure of carbon nanotubes.   4

IV   (a)   Describe chemical vapour deposition method for the synthesis of carbon nanotube.   4

(b)   Explain ion exchange method.   4

PART—C
(Maximum marks : 30)
(Answer one full question from each unit. Each question carries 15 marks.)

UNIT—I

V   (a) Write down the molecular formula of following compounds :

(i)   Sodium sulphate   (iii)   Potassium carbonate

(ii)   Ammonium phosphate   (iv)   Aluminium chloride.   4

[P.T.O

Marks

(b) What is the volume of the solution that would result by diluting 70ml of 0.0913 N NaOH to a concentration of 0.0150 N ?   4

(c) Explain the Lewis concept of acid and base with an example.   4

(d) Which indicator you would adopt for the titration of $Na_2CO_3 \times H_2SO_4$? Give reason.   3

Or

VI (a) Explain the following terms with two example for each :

       (i) Radical   (ii) Valency.   4

(b) What you understand about :

       (i) Strong acid and strong base   (ii) weak acid and weak base.   4

(c) The sterile saline solution used to rinse contact lenses can be made by dissolving 400 mg. of NaCl in sterile water and diluting to 100ml. What is the molarity of the solution ?   4

(d) Balance the following equations :

       (i) $C_3H_8 + O_2 \rightarrow CO_2 + H_2O$

       (ii) $Mg + HNO_3 \rightarrow H_2 + Mg(NO_3)_2$.   3

Unit—II

VII (a) Draw a flow chart for the production of potable water for municipal supply.   4

(b) Explain the disadvantages of hard water.   4

(c) What are the properties of carbon nanotubes ?   4

(d) Give any three applications of carbon nanotubes.   3

Or

VIII (a) What are the application of nanomaterials in medicine ?   4

(b) Explain the reason for temporary hardness and how it can be removed ?   4

(c) What is sterilization of water ? Mention the different methods of sterilization of water.   4

(d) Explain Plasma process.   3