TED (10)–1003 A

(REVISION—2010)

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY OCTOBER, 2012

APPLIED SCIENCE–I (Physics)

(Common–except DCP and CABM)

[*Time* : 1½ hours

(Maximum marks : 50)

PART—A

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

Marks

I (a) What are giga and femto ?   2

(b) Define rotational kinetic energy. Give the expression for it.   2

PART—B

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

II (a) Obtain the expression for range of a projectile and deduce the condition for maximum range.   4

(b) Explain why the outer end of road is laid at a higher level than the inner on the curved portion of the road.   4

III (a) Define impulse of a force and show that it is equal to change in momentum.   4

(b) Define parallel and perpendicular axes theorem.   4

IV (a) Obtain an expression for the moment of inertia of a disc about an axis passing through the centre and perpendicular to its plane.   4

(b) State Hooke's law. Deduce the expression for bulk modulus.   4

PART—C

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

UNIT—I

V (a) Explain the recoil velocity of a gun.   3

(b) When a body is thrown up, show that time of ascent is equal to time of descent.   6

(c) A body travels 100 m during 4th second and 150 m during the 9th second of its motion. Find the distance travelled by the body during the 11th second of its motion.   6

OR

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Marks

VI   (a) Write the advantages of SI system over the other system of units.   3

(b) Derive the expression for the period of a simple pendulum.   6

(c) A stone of mass 900 gm tied at the end of string is whirled round horizontally in a circle of radius 2 m, with a speed of 120 rev/min. Calculate the centripetal acceleration and force.   6

Unit—II

VII   (a) Define radius of gyration.   3

(b) A circular disc of mass 0.5 kg and radius 0.1 m is rotating about a tangent in its plane. If it makes 5 rotations/min, calculate its rotational kinetic energy.   6

(c) Derive the equation for time period of a satellite.   6

Or

VIII   (a) Explain geostationary satellite.   3

(b) State Newton's Universal Law of Gravitation. Derive the expression for orbital velocity of a satellite.   6

(c) A 10 kg weight is attached to one end of a copper wire 4 m long and diameter 2 mm. Find the extension produced if young's modulus of wire is equal to 1.25×10^{11} N/m^2.   6

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TED (10)–1003 B

(REVISION—2010)

FIRST SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY
OCTOBER, 2012

APPLIED SCIENCE–I (Chemistry)

(Common–except DCP and CABM)

[*Time* : 1½ hours

(Maximum marks : 50)

PART—A

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

Marks

I   (a) Rain water is the purest form of natural waters. Give reason.   2

(b) P^H of a cold drink is 5. What will be its action on blue and red litmus solution ?   2

PART—B

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

II   (a) Find the oxidation number of "Cr" in $K_2Cr_2O_7$ and Cr_2O_3.   4

(b) Explain the role of ion-exchange resins in softening of hard water.   4

III   (a) What is acid-base indicator ? What type of indicators are used in the
following set of titrations :

(i) $HNO_3 \times NaOH$ (iii) $NaOH \times$ acetic acid.

(ii) $Na_2CO_3 \times H_2SO_4$ 4

(b) How do water becomes hard water ? Define degree of hardness of water.   4

IV   (a) Point out the reducing and oxidizing agents in the following reaction :

$$MnO_2 + 4HCl \rightarrow MnCl_2 + Cl_2 + 2H_2O$$ 4

(b) Enumerate the applications of carbon nanotubes in medicine.   4

PART—C

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

UNIT—I

V   (a) Explain the neutralization reaction according to Arrhenius concept and Lewis
concept with suitable example.   4

(b) Define p^H. Calculate the p^H of 0.001 normal NaOH solution.   4

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[P.T.O.]

Marks

(c) Calculate the mass of zinc required to produce 20 g of H_2 gas at STP using hydrochloric acid (At. wt. Zn – 65.5).   4

(d) Applying the following equation, calculate the equivalent mass of $Ca(OH_2)$:

$Ca(OH)_2 + H_2SO4 \rightarrow CaSO_4 + 2H_2O$.   3

OR

VI   (a) Copper sulphate solution is taken in a beaker and iron metal rod is dipped in it. The following reaction occurs :

$Cu^{2+}(aq) + Fe(s) \rightarrow Fe_{2+}(aq) + Cu(s)$
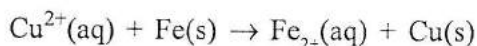
What are the changes you can observe ?   3

(b) What are the different types of buffer solutions? Give examples.   4

(c) Define standard solution and normal solution.   4

(d) Calculate the mass of H_2SO_4 required to make 0.01 Normal 200 ml solution.   4

UNIT—II

VII   (a) What are the disadvantages of using hard water ?   4

(b) Define ionic product of water. How will you obtain its value ?   4

(c) Explain any two methods for the synthesis of carbon nanotubes.   4

(d) What is sterilization of water ? Mention any two sterilization methods of water.   3

OR

VIII   (a) Give any two advantages of using hard water.   3

(b) Comment on the structure of carbon nanotubes.   4

(c) Explain the different types of filtrations in water treatment.   4

(d) Write down the EDTA titration method for the estimation of hardness of water.   4