TED (10) 1003 A

Reg. No. .....

(REVISION – 2010)

Signature .....

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

Marks

(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} m^2 stretches by the same amount as a copper wire of length 3.5 m and area of cross section 4×10^{-5} m^2 under a given load. What is the ratio of Young's Modulus of steel to that of copper ? 6

TED (10)–1003 B

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

APPLIED SCIENCE–I (Chemistry)

(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) Define Normality.

(b) Give reason for the hardness of water. (2×2=4)

PART—B

(Maximum marks : 16)

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

II (a) The concentration of glucose ($C_6H_{12}O_6$) in normal blood is approximately 90 mg. per 100 ml. What is the molarity of the glucose ? 4

(b) What are radicals ? Give two examples. 4

III (a) Explain redox reaction with an example. 4

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

IV (a) Explain the disadvantages of hardwater. 4

(b) What are the applications of carbon nanotubes ? 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) Balance the following equations :

(i) $NH_3 + Cl_2 \rightarrow N_2H_4 + NH_4Cl$

(ii) $Fe + O_2 \rightarrow Fe_2O_3$ 4

(b) Write down the molecular formula of following compounds :

(i) Calcium sulphate (iii) Potassium carbonate

(ii) Ammonium phosphate (iv) Magnesium nitrate 4

[P.T.O.

Marks

(c) (i) Calculate the pH of an aqueous ammonia solution that has an $\bar{O}H$ concentration of 1.9×10^{-3} M.

(ii) Calculate the pH of a 0.025M HNO_3 solution. 4

(d) Explain neutralization reaction with an example. 3

OR

VI (a) Classify the following as Lewis acid and Lewis base.
H_2O, Al^{3+}, $\bar{C}l$, NH_3, Fe^{2+}, $\bar{O}H$, BF_3, Na^+. 4

(b) Calculate the molecular weight of following compounds :

(i) $C_{12}H_{22}O_{11}$ (iii) Fe_2O_3

(ii) H_2SO_4 (iv) $C_4H_8O_2$ 4

(c) A bottle of 12.0 N hydrochloric acid has only 35.7 ml left in it. What will the HCl concentration be if the solution is diluted to 250.0 ml ? 4

(d) Define ionic product of water. Write its expression. 3

UNIT—II

VII (a) List the properties of carbon nanotube. 4

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

(c) Explain chemical vapour deposition method for the synthesis of carbon nanotube. 3

(d) Explain different types of filteration used in water treatment. 4

OR

VIII (a) What are the characteristics of potable water ? 4

(b) Explain ion exchange method. 4

(c) What are the applications of nanomaterials in medicine ? 4

(d) Explain High pressure carbon monoxide deposition method for the synthesis of carbon nanotube. 3