

SECOND SEMESTER DIPLOMA EXAMINATION IN ENGINEERING/
TECHNOLOGY—OCTOBER, 2011

APPLIED SCIENCE — II
(Common-Except DCP & 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

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

- | | Marks |
|---|-------|
| I (a) State triangle law of addition of vectors. | 2 |
| (b) Draw the symbol and write the truth table of OR gate. | 2 |

PART– B

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

- | | |
|---|---|
| II (a) Explain an experiment to determine coefficient of viscosity of a highly viscous liquid. | 4 |
| (b) Calculate the work done in blowing a liquid bubble of radius 4 cm. Surface tension of liquid is 30×10^{-3} N/m. | 4 |
| III (a) Find out the magnification of a simple microscope of the focal length of its lens is 100 cm and distance of distinct vision is 20 cm. | 4 |
| (b) Distinguish between spontaneous emission and stimulated emission. | 4 |
| IV (a) How will you convert a galvanometer into an ammeter ? | 4 |
| (b) Explain magnetostriction method to produce ultrasonic waves. | 4 |

PART - C

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

UNIT - I

- V (a) Distinguish between resultant and equilibrant.
 (b) Explain the working principle of atomiser.
 (c) Calculate the wave length of ultrasonic waves of frequency 60000 Hz when propagated through a liquid with a velocity 1.5×10^3 m/sec.
 (d) Derive expressions for the magnitude and direction of the resultant of two vectors acting at an angle θ using parallelogram law.

OR

- VI (a) The radius of a pipe changes from 8 cm to 4 cm. If the velocity of the wider region is 2.5 m/sec, calculate the velocity of the narrow region.
 (b) Discuss the variation of viscosity of liquid and gas with temperature.
 (c) Explain the term couple and write the equation for moment of couple.
 (d) Distinguish between Transverse and longitudinal waves. Find a relation connecting frequency wave length and velocity.

UNIT - II

- VII (a) State the laws of refraction. Write a relation connecting refractive index and velocity of light.
 (b) A straight conductor 3 cm long carrying a current 6 amp is placed at 60° to a magnetic field of intensity 1.5 Tesla. Calculate the force on the conductor.
 (c) Explain an experiment to demonstrate photoelectric effect.
 (d) Describe the construction, principle and working of a moving coil galvanometer.

OR

- VIII (a) Ultraviolet light of wave length 2.5×10^{-7} m is falling on a metal whose work function is 4×10^{-19} J. Calculate the kinetic energy of the emitted electrons.
 (b) Applying kirchoff's laws, deduce the balancing condition for wheatstone's bridge.
 (c) Identify the Logic gate whose outputs are high only when the two inputs are different and write its truth table.
 (d) An object of length 2 cm is placed in front of convex lens at a distance 40 cm. The image is formed on the other side on screen at a distance 60 cm. Find the focal length of the lens and size of the image.

SECTION – II
Chemistry
 (Maximum marks : 50)

PART – A

(Answer the following questions in one or two sentences.

Each question carries 2 marks)

- | | Marks |
|--|-------|
| I (a) Can we store copper sulphate in iron vessel. Why ? | 2 |
| (b) Why photochemical smog is so called ? | 2 |

PART – B

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

- | | |
|---|---|
| II (a) (i) What is activity series ? | |
| (ii) Is it safe to stir silver nitrate (AgNO_3) solution with copper spoon, substantiate your answer. | |
| (Given : $E^\circ_{\text{Ag}^+/\text{Ag}} = +0.84\text{V}$, $E^\circ_{\text{Cu}^{2+}/\text{Cu}} = +0.34\text{V}$) | 4 |
| (b) “Galvanic corrosion is similar to generation of electric current in an electrochemical cell”. Prove the statement with suitable example. | 4 |
| III (a) State the significance of the numbers in the polymer names – Nylon 6,6 and Nylon 6. Write the monomers used for making Nylon 6,6 and Nylon 6. | 4 |
| (b) What are ceramic matrix composites ? List any two properties and uses of it. | 4 |
| IV (a) Physical and chemical adsorption respond differently to a rise in temperature. What is the difference and why is it so ? | 4 |
| (b) Complete the following : | |

Name of fuel	Constituents	Uses
Producer gas	Running gas engines
.....	Carbon monoxide and hydrogen	As a fuel gas
CNG	Methane, small quantities of ethane and propane
LPG	Domestic fuel

4

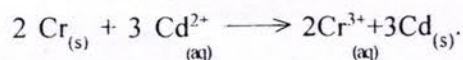
PART - C

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

UNIT - I

V (a) Explain electrolysis by taking molten sodium chloride as an example. 4

(b) Formulate the galvanic cell in which the following reaction taking place :



(Given : $E^\circ \text{Cr}^{3+}/\text{Cr} = -0.74\text{V}$; $E^\circ \text{Cd}^{2+}/\text{Cd} = -0.40\text{V}$)

(i) Which is the electrodes-positively and negatively charged ?

(ii) Write the reaction takes place at each of the electrodes.

(iii) Calculate the emf of all the cell. 4

(c) Arrange the following metals in order in which they displace each other and explain :

Al, Cu, Fe, Mg and Zn.

(Given E° values of $\text{Al}^{3+}/\text{Al} = -1.66 \text{ V}$

$$\text{Cu}^{2+}/\text{Cu} = +0.34\text{V}$$

$$\text{Fe}^{3+}/\text{Fe} = +0.77\text{V}$$

$$\text{Mg}^{2+}/\text{Mg} = -2.37\text{V}$$

$$\text{Zn}^{2+}/\text{Zn} = -0.76\text{V}$$

(d) What is Surface chemistry ? Give any two process which deals in surface chemistry. 3

OR

VI (a) Name the phenomenon taking place in the following process and elucidate :

(i) Silica gel placed in atmosphere saturated with water.

(ii) Anhydrous calcium chloride (CaCl_2) placed in the atmosphere saturated with water. 4

(b) A cell is prepared by dipping a copper rod in 1M CuSO_4 solution and a nickel rod in 1 M NiSO_4 solution. The standard reduction potentials of copper and nickel electrodes are -0.34V and -0.25V respectively :

(i) What will be the cell reaction ?

(ii) What will be the standard emf of a cell ?

(iii) Which electrode will be positive ?

(iv) How will be the cell represented ? 4

(c) Can we store :

(i) Copper sulphate solution in Zinc vessel.

(ii) Copper sulphate solution in silver vessel.

Give suitable explanation (given $E^\circ \text{Cu}^{2+}/\text{Cu} = +0.34\text{V}$, $E^\circ \text{Zn}^{2+}/\text{Zn} = -0.76\text{V}$ and $E^\circ \text{Ag}^+/\text{Ag} = +0.80\text{V}$) 4

(d) How is underground iron pipes are protected ? Explain the theory behind it. 3

UNIT – II

- VII (a) What are polymers ? How are they classified based on their structures ? 4
- (b) The fuels used in rocket for their propulsion are called propellants.
- (i) How are propellants classified based on the physical state and one example each ?
- (ii) Name the type of propellants used in SLV-3 and ASLV rockets. 4
- (c) What you mean by Green chemistry ? How will it helps to reduce environmental pollution ? 4
- (d) Give reason :
Number of organic compounds is so large when compared to inorganic compounds. 3

OR

- VIII (a) What is Isomerism ? Write down the isomers of following compounds :
(i) C_4H_{10} (ii) C_2H_6O . 4
- (b) Name the monomers and uses of the following polymers :
(i) Silicon rubber (ii) Buna N (iii) Bakelite (iv) Nylon-6. 4
- (c) When pH of the rain water drops below 5.6 is called acid rain
(i) What are the major compounds responsible for acid rain ?
(ii) How does the statues and monuments in India are affected by acid rain ? 4
- (d) What are primary and secondary fuels ? Give two examples for each category. 3