DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE — OCTOBER, 2017

ENGINEERING CHEMISTRY – II

[*Time* : 3 hours

(Maximum marks : 100)

Marks

PART — A

(Maximum marks : 10)

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

1. State Pauli's exclusion principle.

2. What is galvanization ?

3. What is the effect of temperature on the electrical conduction of metals and electrolytes ?

4. Identify the functional groups in the following molecules.

    (i) CH_3-CH_2-$COOCH_3$ (ii) CH_3-CH_2-CH_2-NH_2

5. Give two examples of a nuclear fuel.   (5×2 = 10)

PART — B

(Maximum marks : 30)

II   Answer any *five* of the following questions. Each question carries 6 marks.

1. (a) Explain hydrogen bonding with an example.

    (b) Write the equation to calculate the wavelength of matter waves and explain the terms.   (4+2=6)

2. (a) Reduction potentials of Zn and Ag electrodes are -0.76 V and 0.80 V respectively:

        (i) Compute the e.m.f. if a cell is constructed using these electrodes.

        (ii) Which metal displaces the other from its solution? Give reason.

    (b) Mention any two differences between electroplating and anodising.   (4+2=6)

[6]

Marks

3. (a) Distinguish between saturated and unsaturated organic compounds with one example.
   (b) What is safety glass ? (4+2=6)

4. (a) Distinguish between classical smog and photochemical smog.
   (b) Mention any two applications of green chemistry in day to day life. (4+2=6)

5. (a) State Aufbau principle and write the electronic configuration of fluorine and argon.
   (b) Draw the shapes of s and p_x orbitals. (4+2=6)

6. (a) What is a salt bridge ? What are its functions ?
   (b) Give two examples each for primary cells and secondary cells. (4+2=6)

7. (a) What is natural rubber ? How can you modify the properties of natural rubber.
   (b) What are refractories ? (4+2=6)

PART — C

(Maximum marks : 60)

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

UNIT — I

III (a) Give the postulates of Bohr's model of atom. 6
    (b) State Octet rule. Explain how it is followed in NaCl molecule. 5
    (c) Write the possible values of n, l, m, and s for an electron in $3p$ orbital. 4

Or

IV (a) State Heisenberg's uncertainty principle. Calculate the uncertainty in the velocity of an electron if the uncertainty in position is 10^{-10} m. ($h = 6.625 \times 10^{-34}$ kgm^2 s^{-1}, $m = 9.1 \times 10^{-31}$ kg). 6
   (b) Differentiate between an orbit and an orbital. 5
   (c) State Hund's rule. Show that the presence of three unpaired electrons in nitrogen is in accordance with Hund's rule. 4

UNIT — II

V (a) Explain the working of H$_2$- O$_2$ fuel cell with the help of a labelled diagram. Write the reactions involved. 6
  (b) What is electrochemical series ? Give any three applications of electrochemical series. 5
  (c) Explain electrochemical theory of corrosion. 4

Or

Marks

VI (a) Define electrolysis. Explain the electrolysis of aqueous Sodium Chloride. 6
   (b) State Faraday's laws of electrolysis and give their mathematical expression. 5
   (c) Distinguish between chemical and electrochemical corrosion. 4

UNIT — III

VII (a) Write short notes on :
    (i) catenation (ii) tetracovalency (iii) isomerism 6
    (b) Distinguish between thermoplastics and thermosetting plastics. Give one example for each. 5
    (c) Mention any four advantages of optical fibres over conventional copper cables. 4

Or

VIII (a) How polymers classified, based on the type of polymerization ? Explain with one example each. 6
     (b) Mention any five differences between organic and inorganic compounds. 5
     (c) Give any two synthetic rubbers and their monomers. 4

UNIT — IV

IX (a) Explain cracking with an example and give two advantages of catalytic cracking over thermal cracking. 6
   (b) What is soil pollution? What are its major causes and effects ? 5
   (c) Compare solid, liquid and gaseous fuels. 4

Or

X (a) How is ozone produced in the stratosphere ? How is it depleted and give its consequences. 6
  (b) List any five characteristics of a good fuel. 5
  (c) What is water pollution ? Write three important sources of water pollutants. 4

———