TED (15/19)2004
(Revision – 2015/19)

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Reg. No……
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DIPLOMA EXAMINATION IN ENGINEERING/TECHNOLOGY/ MANAGEMENT/COMMERCIAL PRACTICE, APRIL - 2025

ENGINEERING CHEMISTRY - II

[Maximum Marks: **100**] [Time: **3** Hours]

PART-A

[Maximum Marks: **10**]

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

1. Which among the following does not make sense?

   1s, 2p, 2d, 3f, 4d.

2. What is a weak electrolyte? Give an example.
3. What are primary cells? Give one example.
4. What is neoprene? Give its structure.
5. Give two examples each for liquid and gaseous fuels. (5 x 2 = 10)

PART-B

[Maximum Marks: **30**]

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

1. a) State Octet rule. Support your answer with two examples. (3)

   b) Give 2 limitations of Octet rule. (3)

2. a) State Heisenberg's uncertainty principle. Give its mathematical expression. (3)

   b) The uncertainty in the momentum of an electron is 1.0×10^{-5} $kgms^{-1}$ What will be the uncertainty of its position? [Take $h = 6.626 \times 10^{-34}$ $kgm^2 s^{-1}$] (3)

3. a) What are conductors? Give any two differences between metallic conductors and electrolytic conductors. (3)

   b) What is meant by electroplating? Give any two advantages of electroplating. (3)

4. a) What is meant by corrosion? Mention any two factors that favour the rusting of iron. (3)

   b) Explain cathodic protection with a suitable example. (3)

5. a) What is a copolymer? Give an example and mention the monomer units in it. (3)

   b) Write the functional group present in the following compounds

   (i) Carboxylic acids (ii) Aldehydes (iii) Primary amines (3)

6. a) What are natural polymers? Give any two examples. (3)

b) What are the major constituents of soda glass? Mention one of its uses. (3)

7. a) Define calorific value. What is its unit? (3)

b) List any three qualities of an ideal fuel. (3)

(5 x 6 = 30)

PART-C

[Maximum Marks: **60**]

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

UNIT – I

III. a. What is an orbital? Draw the shapes of the p_x, p_y and p_z orbitals. (5)

b. Give the electronic configuration of K (Z=19) and write then *n*, *l* and *m* values of the valence electron. (5)

c. State Hunds rule of maximum multiplicity. Illustrate using Nitrogen. (5)

OR

IV. a. Give the de Broglie relationship and explain the terms. What is its significance? Calculate the de Broglie wavelength of a stone of mass 0.275 kg thrown at the speed of 4×10^4. (Take $h=6.6 \times 10^{-34}$ Js). (5)

b. What is meant by Intermolecular and Intramolecular hydrogen bonding? Give an example for each. (5)

c. What is a covalent bond? Explain the covalent bond formation in

(i) Hydrogen molecule and (ii) H - Cl molecule (5)

UNIT – II

V. a. What are fuel cells? Write the electrode reactions of a H2-O2 fuel cell. (5)

b. State Faradays first and second laws of electrolysis. Represent it mathematically (5)

c. What the mechanism of electrochemical corrosion. (5)

OR

VI. a. Explain the electrolysis of aqueous NaCl solution using Platinum electrodes. (5)

b. What is a salt bridge? What is its role in an electrochemical cell? (5)

c. Imagine a galvanic cell constructed between Ag and Cu electrodes. (5)

($E^0_{Ag/Ag^+} = 0.80V$ and $E^0_{Cu/Cu2+} = 0.34V$). Write the

(i) anodic half-cell reaction

(ii) cathodic half-cell reaction

(iii) total cell reaction

(iv) cell representation

(v) emf of the cell

UNIT- III

VII. a. What are refractories? How are they classified according to the chemical composition? (5)

b. Explain vulcanisation of rubber. List three advantages of vulcanisation. (5)

c. What are optical fibres? Give its uses. (5)

OR

VIII. a. Distinguish thermoplastics from thermosetting plastics. Give an example for each. (5)

b. What is Buna - S and Buna - N? Which are the monomers in them Give their uses. (5)

c. What are fibres and elastomers? (5)

UNIT - IV

IX. a. What is London smog? How is it caused? (5)

b. Explain thermal and catalytic cracking. (5)

c. List any 5 principles of Green Chemistry. (5)

OR

X. a. Discuss briefly about Industrial gases like Water gas and Producer gas. (5)

b. Briefly discuss about any five sources of water pollution. (5)

c. Give a brief account an environmental disaster. (5)

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