



TED (15) – 2004

Reg. No. ....

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SECOND SEMESTER DIPLOMA EXAMINATION IN  
ENGINEERING/TECHNOLOGY — OCTOBER, 2016

ENGINEERING CHEMISTRY – II

(Common to all branches except DCP and CABM)

[Time : 3 hours

(Maximum marks : 100)

PART — A

(Maximum marks : 10)

Marks

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

1. Arrange the following orbitals in the order of their increasing energies.  
 $3s, 3d, 4s$  and  $4p$
2. Define electrochemical equivalent of a substance.
3. Identify the functional groups in the following molecules.  
(i)  $\text{CH}_3\text{-CO-CH}_2\text{-CH}_3$                       (ii)  $\text{CH}_3\text{-CHO}$
4. Name any two acids present in acid rain.
5. Give two examples for anti-rust solutions.

(5×2 = 10)

PART— B

(Maximum marks : 30)

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

1. (a) What information about an electron does each of the four sets of quantum numbers ( $n, l, m$  and  $s$ ) provide ?  
(b) Draw the formation of a coordinate bond using any one example. (4+2=6)
2. (a) State Faraday's laws of electrolysis.  
(b) Conductivity of 1M nitric acid is greater than 1M oxalic acid. Why ? (4+2=6)
3. (a) What are refractories and how are they classified based on their physical nature ? Give one example for each.  
(b) How are polymers classified based upon origin ? Give one example for each. (4+2=6)
4. (a) List four characteristics of a good fuel.  
(b) Define the term pollution and pollutant. (4+2=6)





Marks

5. (a) Draw the shapes of  $s$ ,  $p_x$ ,  $p_y$  and  $p_z$  orbitals.  
(b) Which of the following orbital configuration is wrong? Justify.
- (i)  $2p_x^1 p_y^1 p_z^1$  (ii)  $2p_x^2 p_y^1 p_z^0$   
(iii)  $2p_x^1 p_y^1 p_z^0$  (iv)  $2p_x^0 p_y^1 p_z^1$  (4+2=6)
6. (a) Explain the reactions taking place when  
(i) Zn rod is dipped in dil.  $H_2SO_4$   
(ii) Zn rod is dipped in  $CuSO_4$  solution  
(b) An electrochemical cell is constructed using Zn ( $E^0 Zn^{2+} / Zn = -0.76V$ ) and cobalt ( $E^0 Co^{2+} / Co = -0.28V$ ). Calculate the e.m.f. of the cell. (4+2=6)
7. (a) Distinguish between natural and synthetic rubber.  
(b) Give two tests for unsaturation. (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) Explain the formation of ionic bond and covalent bond using, one example each. 6  
(b) Write the possible values of  $n$ ,  $l$ ,  $m$  and  $s$  for an electron present in the 4<sup>th</sup> orbit. 5  
(c) Calculate de Broglie wavelength of an electron moving with a velocity of  $7.286 \times 10^4 \text{ ms}^{-1}$  ( $h = 6.626 \times 10^{-34} \text{ kgm}^2\text{s}^{-1}$ ,  $m_e = 9.1 \times 10^{-31} \text{ kg}$ ). 4

OR

- IV (a) Mention the important postulates of Bohr's model of an atom. 6  
(b) State Heisenberg's uncertainty principle. The uncertainty in position and velocity of a particle are  $0.1\text{m}$  and  $5.27 \times 10^{-24} \text{ ms}^{-1}$  respectively. Calculate the mass of the particle. ( $h = 6.626 \times 10^{-34} \text{ kgm}^2\text{s}^{-1}$ ) 5  
(c) Define the term electronegativity and which is the most electronegative element? Which type of bond is usually formed between two elements of almost same electronegativity? 4

UNIT — II

- V (a) How are materials classified based upon electrical conduction? Give two examples for each. 6  
(b) Write the electrode reactions taking place during the electrolysis of molten and aqueous NaCl. Which of this process gives NaOH as the byproduct? 5  
(c) Explain electrochemical theory of corrosion. 4

OR





Marks

- VI (a) Write the conditions and mechanism of rusting of iron. 6
- (b)  $Al/Al^{3+}/Sn/Sn^{2+}$  represents a galvanic cell.
- (i) Which is the anode and which is the cathode ?
- (ii) Write the electrode and net cell reactions.
- (iii) What is the direction of current flow ? 5
- (c) Distinguish between electronic and ionic conductors. 4

UNIT – III

- VII (a) Define thermoplastics and thermosetting plastics. Give two examples for each. 6
- (b) What are glasses ? Mention any four of its properties and four varieties. 5
- (c) Comment on the catenation and isomerism phenomena generally observed in organic compounds. 4

OR

- VIII (a) Crude rubber is not generally used as an engineering material.
- (i) List any four limitations of crude rubber.
- (ii) Name the process to modify crude rubber and explain the process.
- (iii) What is ebonite ? 6
- (b) What are optical fibres ? Mention any two of its applications and two advantages. 5
- (c) Write any four differences between organic and inorganic compounds. 4

UNIT – IV

- IX (a) Explain cracking with an example. Distinguish between thermal and catalytic cracking. 6
- (b) What is green chemistry ? Write any three practical applications of green chemistry in day-to-day life. 5
- (c) What is meant by ozone umbrella ? How does depletion in ozone layer affect the environment ? 4

OR

- X (a) Define calorific value of a fuel and give its unit. Calorific value of producer gas is much lower than water gas. Why ? 6
- (b) What are the major causes of soil pollution and how can we control it ? 5
- (c) (i) Arrange the different layers of the atmosphere in accordance with their distance from the earth's surface.
- (ii) List any two disastrous incidents of environmental pollution. 4





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