

**III B.Tech II Semester Supplementary Examinations,  
November/December 2005  
CORROSION ENGINEERING  
(Chemical Engineering)**

Time: 3 hours

Max Marks: 80

**Answer any FIVE Questions  
All Questions carry equal marks**

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1. (a) Calculate the emf of the cell,  $Zn/Zn^{2+}, (a=1) || Cu^{2+}, (a=1) / Cu$  ( $E_{Cu}^o = 0.337V$  and  $E_{Zn}^o = - 0.761 V$ ). Also find the emf of the cell when the concentration of the Zinc ions is  $0.05 \text{ mol/m}^3$ . Comment on the result obtained.  
 (b) Calculate the electrode potentials of Cd, Ni, and Al for  $10^{-2}$  and  $10^{-4}$  activities of their ions at  $25^\circ C$  using the values of their standard electrode potentials (reduction).  
 $E_{Cd}^o = - 0.42 V$ ;  $E_{Ni}^o = - 0.23 V$ ;  $E_{Al}^o = - 1.69 V$  [8+8]
2. Write short notes on
  - (a) Galvanic corrosion
  - (b) Polarization
  - (c) Cathodic corrosion [5+6+5]
3. (a) Indicate the special name for the atmospheric corrosion of the following metal/alloy.
  - i. Iron and iron base alloy
  - ii. Copper and Copper base alloy
  - iii. Nickel and Nickel base alloy
  - iv. Silver and Silver base alloy
 (b) Furnish isocorrosion charts for Dur iron in sulphuric and nitric acids. [8+8]
4. (a) What is inlet-tube corrosion? Why does it occur?  
 (b) Explain how failures due to erosion corrosion are attributed to impingement. [8+8]
5. (a) Describe the effect of temperature on corrosion.  
 (b) Explain about temperature control and testing method for heating tubes.  
 (c) What are the factors to be considered while writing rate expression. [4+8+4]
6. (a) What do you mean by environment with respect to corrosion in materials?  
 (b) Boiling seawater is less corrosive than hot sea water- explained. [8+8]
7. (a) What is the difference between an electrolytic cell and a galvanic cell? Explain giving examples.  
 (b) Explain: Mixed potential theory. [8+8]

8. Explain the thermodynamics and kinetics principles involved in the study of electrochemical corrosion. [16]

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