

BENGAL ENGINEERING AND SCIENCE UNIVERSITY, SHIBPUR

B.E. 4th SEM (Metallurgy Engg.) Final Examination – 2013

Principles of Electrochemistry in Metallurgical Applications (CH-401)

Time : 2 hours

(F.M. – 35)

(Answer any FIVE questions)

1. Illustrate the mechanism of HER with respect to pH. Name some of the technological importance of HER.
(5+2)
2. What are the major types of fuel cell that work above 150° C? Give some of their Characteristic features.
What is the function of polymer electrolyte membrane in PEM fuel cell?
(5+2)
3. Give the schematic and electrochemical reactions occurring in ethanol-air fuel cell.
(3+4)
4. Describe any synthetic procedure for Pt nano particles in the laboratory. Illustrate the different reactions occurring in an electrochemical corrosion cell.
(3+4)
5. Derive the expression of corrosion penetration rate with corrosion current density. 'Tafel equation is a special consequence of Butler–Volmer equation' – justify.
(4+3)
6. Illustrate the variation of oxidation rate of a metal with the relative velocity of the environment. Explain the activity of inclusions on the corrosion behavior of a metal. What is the role of a sacrificial anode in galvanic corrosion?
(2+2+3)
7. Write short notes on (any two)
(i) Stress intensity factor; (ii) Hydrogen damage; (iii) Symmetry factor.
(3½ x 2)