

B.E. (MET) Part-II 4th Semester Examination, 2010

**Principles of Electrochemistry in Metallurgical Applications
(CH-401)**

Time : 2 hours

Full Marks : 35

Answer any FIVE questions.

1. a) Considering Stern Model of the structure of electrified interface show that the total capacitance of the double layer is reduced to Helmholtz-Perrin capacitance in concentrated solutions.
b) What are contact adsorbed ions? J5+2]
2. a) How do you define decomposition potential? Give brief account of polarization behavior of an electrode during discharge of a battery.
b) Give an idea why Pt-Ru electrodes are superior electrocatalysts than Pt alone for a direct ethanol fuel cell. |4+3J
3. Mention which are the major variable parameters that has to be maintained in an electrolytic bath during electroplating. Give brief account of the mechanism of electroplating. 13+4]
4. a) Describe the reaction sequence of Hydrogen evolution reaction on Pt metal in acidic PH medium.
b) Explain Pilling Bedworth ratio with suitable examples. |4+3]
5. Define erosion corrosion. Illustrate the variation of corrosion rate of a material with relative motion of the environment. Describe the beneficial application of galvanic corrosion. J2+3+2J
6. Write down the final form of Butler-Volmer equation and mention the different terms involved in it. Ohm's law is a special consequence of Butler-Volmer equation - Justify. Explain with suitable diagram for the variation of potential and pH for iron in an aqueous environment. [2+2+3]