TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEEING
Examination Control Division
Model Question

Exam	**Regular**		
Level	BE/BAR	**Full Marks**	60
Program	BCH	**Pass Marks**	24
Year / Part	III / II	**Time**	3 Hrs

Subject:- Corrosion Engineering (ENCH 351)

Attempt all questions

1) Explain the chemical and electrochemical corrosion and mention any 4 factors affecting such corrosion. (2+2+4=8)
2) What is a Pourbaix diagram? Construct a generalized E-pH diagram for water and discuss their application in corrosion engineering. (2+4=6)

3) Explain the mechanism of rusting of iron using electrochemical theory, writing anodic, cathodic and overall chemical reaction involved. (4)
4) Explain the difference between activation-controlled process and diffusion-controlled process in corrosion reactions. (4)

5) Draw a labelled Evan's diagram for an electrochemical corrosion system. Illustrate how anodic and cathodic polarization curves determine corrosion potential (E_{corr}) and corrosion current density (I_{corr}). (2+4=6)
6) Provide the basic principle of electrochemical impedance spectroscopy (EIS). (2)

7) Compare Sacrificial anode cathodic protection (SACP) and impressed current cathodic protection (ICCP) listing advantages and limitations for each. (6)

8) a) Explain the role of alloying elements (e.g. Chromium, Nickel, Molybdenum) in improving the corrosion resistance of stainless steel. (4)

   b) Classify corrosion inhibitors based on their mechanism of action. (4)

9) a) Explain the mechanism of corrosion in reinforced concrete structures and provide strategies used to prevent rebar corrosion in concrete. (4)

   b) Explain the working principle and applications of Linear Polarization Resistance (LPR) probes for real time corrosion monitoring. (4)

10) a) Explain how mechanical stress interact with corrosive environments to cause stress corrosion cracking (SCC), corrosion fatigue and hydrogen embrittlement in industrial steels. (4)

b) Explain the main high temperature degradation mechanisms observed in oil refineries and petrochemical plants. (4)