Assignment 2

1. Find out expression for corrosion rate from Faraday's laws of electrochemistry for
   (a) Uniform corrosion and (b) pitting corrosion.
2. Find out multiplication factor for the conversion of corrosion rate from
   (a) mdd to mpy, (b) mpy to mmy^{-1}
3. Find out the corrosion rate of Fe in sea water if the current density is 6.0×10^{-6} A/cm2 in (a) mdd, (b) mmy^{-1} and (c) mpy.
4. What is current density? What is its significance in corrosion kinetics?
5. Show that current density is equivalent to corrosion rate.
6. What are polarization and over voltage?
7. Explain: (a) activation polarization, (b) concentration polarization and (c) resistance polarization.
8. From the activation jump of ions, find out expression for Tafel equation.
9. From the diffusion boundary layer of ions developed at the electrode surface, find out the expression for concentration polarization.
10. Show the importance of ion size, diffusivity and boundary layer thickness on the limiting current density and concentration polarization.
11. What is mixed potential theory?
12. Show graphically different components of cathodic and anodic polarization (both activation and concentration polarization).
13. Show the origin of exchange current density. What is its significance in corrosion rate?
14. Show the use of mixed potential theory (proper illustration):
    (a) Zinc corrosion in pure acid.
    (b) Zinc corrosion in HCl solution with trace amount of Fe^{+++} ions.
    (c) Galvanic corrosion protection of Fe in presence of Zn.
    (d) Effect of exchange current density of hydrogen reaction on the corrosion rate.
    (e) Effect of limiting corrosion current on the corrosion rate.
    (f) Effect of area factor on the corrosion rate.
15. Why is surface condition importance in deciding exchange current density?
16. What is passivation? Explain galvanic coupling on the passivation for (a) Ti-Pd and (b) Fe-Pt couple in acid solution.