



Note: Attempt 5 questions :

(20 marks) for each question.

Q1: How polarization can occur? And what are its types? **(20 marks)**

Q2-a: Identify the materials according to their corrosion rates? **(10 marks)**

Q2-b: A steel plate has corroded on both sides in seawater. After 10 years a thickness reduction of 3 mm is measured. Calculate the average corrosion current density. Take into consideration that the dissolution reaction is mainly $Fe \rightarrow Fe^{2+} + 2e$, and that the density and the atomic weight of iron are 7.8 g/cm^3 and 56, respectively. **(10 marks)**

Q3-a: Explain *galvanic corrosion* and give examples? **(15 marks)**

Q3-b: What is the effect of *flow velocity* on pitting corrosion? **(5 marks)**

Q4: State coating types in details? **(20 marks)**

Q5-a: Discuss the application of cathodic protection with sacrificial anodes? **(10 marks)**

Q5-b: What is the meaning of *precipitation inhibitors*? **(10 marks)**

Q6-a: Scheme the idealized lattice structure of nickel oxide and the effect of Li^+ and Cr^{3+} ions ? **(10 marks)**

Q6-b: Why corrosion can take place in copper pipe which used for conveying cold water? **(10 marks)**

GOOD LUCK

