M. MET. ENGG. EXAMINATION 2004
1st Semester

CORROSION & OXIDATION BEHAVIOUR OF MATERIALS

Time : Three hours

Full Marks : 100

(50 marks for each part)

Use a separate Answer-Script for each part.

PART-I

Attempt Q. 1 & any *two* from the rest.

1. How do relative humidity and SO_2 content in air affect atmospheric corrosion. Differentiate between chemical condensation and capillary condensation. 5+5

2. a) What should be the main considerations in selecting a suitable material for a chemical reactor.

    b) Draw any isocurrosion diagram of a material in an environment say HNO_3.

    c) Draw an isocorrosion diagram in a given environment considering a fixed corrosion rate.

    d) Derive an expression for corrosion rate as a function of concentration and temperature of the corrodent. 5×4

[Turn Over]

3.   Elaborately discuss the 'purpose' and 'fundamental aspects of corrosion testing.'   20

4. a) With the help of a neat diagram explain the three stages of SCC.   5

    b) Discuss the phenomenology of crack initiation process.   8

    c) Explain the role of material chemistry and microstructure on crack propagation process.   7

PART-II

Answer Question No. 5 and any *two* from the rest.

5.   Define the following terms :   2x5

    a) SRB, (b) Corrosion current, (c) Tafel's slope, (d) Salinity, (e) Concentration polarization.

6.   Explain how corrosion on the inner wall of the boiler is influenced by dissolved oxygen and pH1 leading to pilling and caustic embrillement. Give some remedies of the problems. Discuss the outerwall corrosion problem of the boiler.   10+5+5

7. a) Discuss the corrosion problems if the crude petroleum from the well. How they are overcome by CP and inibitor.

    b)   Discuss how marine corrosion is influenced by different parameters.   10+10

8.   Write short notes on :

    a)   Design of CP of an underground steel pipe

    b)   Microbial corrosion

    c)   Electro-chemical determination of corrosion rate.

    7+7+6

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