

22/11/13

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B.E / B.Tech. (Full Time) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2013

MATERIALS SCIENCE AND ENGINEERING

Semester V

16

ML9306 – Corrosion and Surface Engineering

Time : 3 Hours

Answer ALL Questions

Max. Marks 100

Part – A (10 x 2 = 20 Marks)

1. What is Rust? Explain with equations.
2. Explain passivity with diagram.
3. With a suitable diagram, explain galvanic cell. Write the equations involved.
4. What are the types of dezincification? Explain.
5. Write the Tafel equation and explain.
6. What are the differences between mild and severe adhesive wear?
7. What is electrodeposition?
8. With a suitable example, explain corrosion inhibitors.
9. Describe sputter coating.
10. When a cell is constructed using a iron wire and copper wire dipping in dilute H_2SO_4 , current flows from Cu to Fe. The standard potential of Fe and Cu are -0.44 V and 0.34 V. Are these oxidation potentials or reduction potentials? Which is getting oxidized?

Part B (5 x 16 = 80 Marks)

11. Explain cathodic protection. What is the usual problem encountered in cathodic protection system? How do you rectify it?
12. a) (i) Describe Pourbaix diagram for Fe- H_2O system and Al- H_2O system.
(ii) What are the different forms of galvanic cell? Explain.

(OR)

- b) Explain crevice corrosion and pitting corrosion. What are the ways of combating both?
13. a) Write detailed explanation on stress corrosion with all the mechanisms proposed.

(OR)

b) Explain (i) Intergranular corrosion

(ii) Corrosion fatigue.

What are the preventive measures to overcome both?

14. a) (i) What are the advantages of organic coatings?

(ii) Write the constituents of the paint system and explain.

(OR)

b) Explain CVD and PVD processes. What are the major differences between the two processes?

15. a) Explain with diagram (i) Humid chamber test (ii) Immersion test and (iii) Salt water spray test.

Write any two merits and demerits of accelerated corrosion tests.

(OR)

b) (i) Explain combined polarization with the equation involved.

(ii) What are the hypothesis of mixed potential theory?

(iii) Schematically show the representation of the following:

(a) Electrokinetic behavior of pure iron in acid solution. (E^0 for Fe = -0.44V)

(b) Electrokinetic behavior of zinc in acid solution containing Fe^{3+} salts.

(E^0 for Fe^{3+} = +0.78V, E^0 for Zn = -0.76V)

Mark the E_{corr} and i_{corr} in both the diagrams.