Metallurgy

COLLEGE OF ENGINEERING, PUNE – 5.

(An Autonomous Institute of Government of Maharashtra)

End-Semester Examination (2012-13)

B.Tech. (Metallurgy) & M.Tech. (Metallurgy) elective.

MT 403- Corrosion and Surface Protection

Date: November 2012

Time allowed: 3 hrs   Max. Marks: 50

Instructions to students:

     i) All questions are compulsory.

     ii) There are no sections.

     iii) Numbers to the right indicates full marks.

     iv) Draw sketches wherever necessary with pencils only.

     v) Use of electronic calculator is allowed. (Exchange of calculator prohibited

     and if done will be treated as copy case).

Q.1   Answer the following   Marks

Distinguish between the following a) Hydrogen embrittlement and stress

corrosion cracking b) Uniform corrosion and localized corrosion.   10

Q.2   Discuss the following

a) Stray currents resulting from a cathodic protection of buried tank

causes corrosion of nearby buried pipeline, Suggest suitable remedial

measure with suitable sketch so that both the components get protected.

b) A mild steel cylindrical tank 1 m high and 50 cm in diameter contains

aerated water to the 60 cm level and shows loss in weight due to corrosion

of 304 g after six weeks . Calculate a) corrosion current & b) the current

density involved in the corrosion of tank. Assume uniform corrosion on

the tank's inner surface and the steel corrodes in the same manner as pure

iron.   10

Q.3   Answer the following   10

    a) How Improvement in the environmental resistance to oxidation of

       carbon steel using aluminum coating can be done?

    b) Give the order in which the alloys listed below undergo selective

       leaching in sea water and justify your answer i) Alpha brass, ii) Alpha

- Beta brass and iii) Monel (Cu-Ni alloy)..

Q.4   Answer the following   10

  a) A 2.2 kg sacrificial magnesium anode is attached to the steel hull of
      a ship. If the anode completely corrodes in 100 days, what is the
      average current produced by the anode in this period?

  b) Discuss salient features of ASTM G1-03 standard.

Q.5   Answer the following   10

  a) A 1 cm^2 sample of 99.94 wt. % nickel, 0.75 mm thick is oxidized in
      oxygen at 1 atmosphere pressure at 600°C. After 2 h sample showed
      a weight gain of 70 µg/cm^2. If this material shows a parabolic
      oxidation behavior, what will be the weight gain after 10 h?
      (Assume parabolic constant = 0)

b) The wall of a steel tank containing aerated water is corroding at a rate
of 54.7 mdd. How long it will take for the wall thickness to decrease by 0.50
mm?

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All the Best

END

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