Reg.NO	

MANIPAL UNIVERSITY, MANIPAL
DEPARTMENT OF CHEMISTRY, MIT, MANIPAL
II SEMESTER B.E. MAKE UP EXAMINATION
JULY 2010
SUBJECT: ENGINEERING CHEMISTRY (CHM 101/102)
Revised Credit System

Time : 3 hr   Max.Marks: 50

Note : Answer any FIVE full questions. Draw neat and labelled diagram wherever necessary.

1.A.   (i) What is corrosion? Explain the electrochemical theory of corrosion by taking an example.
        (ii) What are fuel cells? Explain the construction and working of methanol - oxygen fuel cell.
   B.   (i) What is single electrode potential? Discuss the origin of single electrode potential.
        (ii) What are the advantages of electroless plating? Discuss the electroplating of chromium.
   C.   Give reasons:
        (i) Thermoplastics undergo reversible deformation but thermosets do not.
        (ii) Impure metals corrode faster than pure metals under identical conditions.

                                                                                (4 + 4 + 2)

2.A.   (i) What is cathodic protection? Explain the cathodic protection methods.
        (ii) What is knocking? Discuss the mechanism of knocking. Mention the limitations of knocking and its prevention methods.
   B.   (i) Discuss the method of determining the G.C.V and N.C.V of a gaseous fuel.
        (ii) A galvanic cell consists of an iron electrode dipped in 1.0 M solution of $FeSO_4$ and a manganese electrode dipped in 0.1 M solution of $MnSO_4$. Calculate the change in free energy of the cell at 298 K. Given that the standard reduction potential of iron and manganese electrode are ─ 0.44 V and ─1.18 V respectively.
   C.   (i) Give reason: Lead acid battery fails to start a vehicle at a very low temperature.
        (ii) Explain the tacticity of polymers with PVC as an example.

                                                                                (4 + 4 + 2)

3.A.   (i) Describe the construction and working of dry cell with reactions. What are the disadvantages of this battery?
        (ii) What is cracking of petroleum? Describe the fluidized catalytic cracking process.
   B.   (i) What is a standard cell? Explain the potentiometric method of measurement of emf of a cell.
        (ii) Give the method of synthesis and properties of silicon rubber.
        (iii) Why is a slight warming effect observed in a stretched rubber band?
   C.   Explain how the following factors affect the rate of corrosion.
         (i) Anodic and cathodic area   (ii) Polarization

                                                                                (4 + 4 + 2)

4.A.   (i) Describe the manufacture of producer gas and mention its two important uses.
      (ii) Discuss the effect of organic additives on the nature of electrodeposits.
   B.   Distinguish the followings.
      (a) Galvanization and tinning process   (b) Concentration and kinetic polarization
      (c) Bulk and solution polymerisation   (d) Galvanic and electrochemical series
   C.   What is vulcanization? Explain the process of vulcanization of rubber.

(4 + 4 + 2)

5.A.   (i) What are concentration cells? Give an example. Deduce an expression to determine the emf of a concentration cell.
      (ii) Explain the following types of corrosion with examples.
       a) Galvanic corrosion   b) Differential aeration corrosion
   B.   (i) Explain addition and condensation polymerisation with examples. Give any four differences between them.
      (ii) How is the percentage of carbon and hydrogen determined in a solid fuel?
   C.   Polymer molecules with different degree of polymerization such as 500, 750, 850 and 1100 are mixed in molecular ratio 1: 2: 3: 4 in a sample of high polymer of propene. Calculate the number average and weight average molecular weights.

(4 + 4 + 2)

6.A.   Deduce the mathematical expressions for ΔG, ΔH and ΔS for a galvanic cell.
   B.   (i) 2.0 g of a coal sample was used for nitrogen estimation by Kjeldahl method. The evolved ammonia was collected in 50 mL of 0.2 N sulphuric acid. To neutralize excess acid 22 mL of 0.1 N NaOH was required. Determine the percentage of nitrogen in the sample.
      (ii) Briefly explain the effect of structure of polymer on chemical resistance and tensile strength.
   C.   Give reasons for the followings:
      (i) Electrolyte concentration is invariant in Nickel- Cadmium battery.
      (ii) Hydrogen electrode is not generally used in pH measurement.

(4 + 4 + 2)