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Sections: A,B,C,D,E,F

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

(An Autonomous Institution affiliated to VTU, Belgaum)

I Sem B.E. (Credit System) Mid Semester Examinations – I October 2012

12CY110 – ENGINEERING CHEMISTRY

Duration: 1 Hour | Max. Marks: 20

*Note: Answer any **One** full question from **each unit.***

Unit – I

1. a) Derive Nernst equation for single electrode potential (3)
   b) Describe the construction, working and applications of $Zn\text{-}O_2$ battery (3)
   c) What are ion-selective electrodes? Explain the experimental method of determination of pH of a solution using glass electrode. Mention the advantages of glass electrode (4)

2. a) What are concentration cells? Derive an expression for EMF of a concentration cell. (3)
   b) A cell is constructed by coupling Zn-electrode dipped in 0.5M $ZnSO_4$ and Ni-electrode dipped in 0.05M $NiSO_4$. Write the cell representation, cell reactions and calculate EMF of the cell. Given that standard reduction potentials Zn and Ni as -0.76 and -0.25 volt respectively. (3)
   c) Describe the construction, working and applications of Pb-acid battery. (4)

Unit – II

3. a) Discuss the mechanism involved in free radical polymerization of ethylene. (4)
   b) Describe the injection and compression moulding of plastics with a neat diagram. (6)

4. a) What is glass transition temperature? Discuss the factors affecting the glass transition temperature. (5)
   b) Explain the manufacture and applications of the following: (i) phenol-formaldehyde resin (ii) Buna –S rubber (5)

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NMAM INSTITUTE OF TECHNOLOGY, NITTE

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I Sem B.E. (Credit System) Mid Semester Examinations – II, November 2012

12CY110 – ENGINEERING CHEMISTRY

Duration: 1 Hour

Max. Marks:20

*Note: Answer any **One** full question from **each Unit.***

Unit – I

1. a) Define corrosion. Explain electrochemical theory of corrosion, taking iron as example. 4
   b) Write notes on (i) Caustic embrittlement (ii) Water-line corrosion. 3
   c) Explain the galvanization process for corrosion control. 3

2. a) What is cathodic protection? Explain sacrificial and impressed current techniques for prevention of corrosion. 4
   b) Discuss the following factors influencing the rate of corrosion. 3
      (i) Relative areas of anode and cathode (ii) Temperature 3
   c) Explain the construction and working of hydrogen-oxygen fuel cell.

Unit – II

3. a) How is alkalinity in water caused? 100 ml of water sample on titration with N/50 HCl requires 8 ml of the acid for phenolphthalein end-point. Another 9 ml of the same acid was needed for further titration to methyl orange end-point. Determine the type and extent of alkalinity present in the water sample. 5
   b) Explain the hot lime soda process of boiler water treatment with reactions. Give any two differences between hot-lime and cold-lime soda process. 5

4. a) Explain the determination of dissolved oxygen in water by Winkler's method. 5
   b) Describe the use of reverse osmosis and electrodialysis for desalination of water. 5

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