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**2002 SCHEME**

**First/Second Semester B.E. Degree Examination, July 2007  
Common to All Branches  
Engineering Chemistry**

Time: 3 hrs.]

[Max. Marks:100

**Note : 1. Answer any FIVE full questions.  
2. Draw neat sketches wherever necessary.**

1.
  - a. With suitable examples, explain the liquid crystalline behaviour in the PAA homologous series. (04 Marks)
  - b. Explain with examples, the liquid crystalline behaviour of compounds based on their chemical constitution. (06 Marks)
  - c. What is Biotechnology? Describe the biosynthesis of vitamin B<sub>12</sub>. (06 Marks)
  - d. Give an account of biofuels. (04 Marks)
  
2.
  - a. Define gross and net calorific value of a fuel. Describe how the calorific value of a gaseous fuel is determined by using Boy's calorimeter. (10 Marks)
  - b. Calculate gross and net calorific value of a gaseous fuel from the following data obtained from Boy's experiment.
    - i) Volume of gaseous fuel burnt at STP = 0.12m<sup>3</sup>.
    - ii) Weight of water used for cooling = 26.0 kg.
    - iii) Temperature of inlet water = 24.0°C.
    - iv) Temperature of outlet water = 42.0°C.
    - v) Weight of water produced by steam condensation = 0.024 kg.
    - vi) Latent heat of steam = 587 k.cal/kg.
    - vii) Specific heat of water = 4.187 kJ/kg/C. (06 Marks)
  - c. Write a note on "Cetane number". (04 Marks)
  
3.
  - a. What are reference electrodes? Explain the construction and working of Ag/AgCl electrode. (06 Marks)
  - b. Write the half cell and net cell reactions and also calculate the voltage generated in the following cell Mn/Mn<sup>2+</sup>//Fe<sup>2+</sup>/Fe when iron rod is immersed in 6.9×10<sup>-4</sup>m FeSO<sub>4</sub> and Mn rod is immersed in 2.6×10<sup>-6</sup> m MnSO<sub>4</sub> solution. Given E<sup>0</sup> for Fe<sup>2+</sup>/Fe is -0.4V and Mn/Mn<sup>2+</sup> is - 1.18V. (06 Marks)
  - c. What are ion selective electrodes? Explain the construction and application of glass electrodes in P<sup>H</sup> determination. (08 Marks)
  
4.
  - a. Describe the construction of Nickel cadmium battery. Give reactions that occur during charging and discharging. Mention any two uses. (06 Marks)
  - b. Mention any two advantages and disadvantages of fuel cells. Describe the construction and working of Methyl alcohol – oxygen fuel cell. (08 Marks)
  - c. Describe the construction and working of Nickel – metal hydride battery. (06 Marks)
  
5.
  - a. What is meant by wet corrosion? Explain the differential metal corrosion using galvanic series. (06 Marks)

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- b. What are inhibitors? Explain the types of inhibitors employed to control corrosion with examples. (08 Marks)
- c. Write a short note on Phosphate coating. (06 Marks)
- 6 a. Explain four factors influencing the nature of an electro deposit. (08 Marks)
- b. Define polarization, decomposition potential and over voltage. Mention their applications with reference to electro deposition. (08 Marks)
- c. Explain the electroless plating of Nickel. (04 Marks)
- 7 a. What are the sources of dust? Explain their harmful effects and any two methods to control them. (08 Marks)
- b. 25cc of an industrial effluent requires 12.5 cc of 0.5N  $K_2Cr_2O_7$  for complete oxidation. Calculate COD of the sample, assuming that the effluent contains only formic acid. Calculate the amount of formic acid present per liter. (Given : Equivalent weight of formic acid is 46). (06 Marks)
- c. Explain two sources of water pollution. Define BOD and COD. (06 Marks)
- 8 a. Explain the classification of polymers with examples. (04 Marks)
- b. Explain the manufacture and applications of the following polymers i) Polyurethane ii) Butyl rubber. iii) Teflon. (12 Marks)
- c. Give an account of polymer composites. (04 Marks)