Engineering Chemistry
Sub Code: P08 CH – 12
First semester B.E. Degree Examination – 2009
Time: 03 hrs (Model Questions paper) Max Marks – 100

Note: Answer any *FIVE* questions. Selecting at least *TWO* questions from Part – A, Or from Part – B

PART – A

1. a) What are Chemical fuels? Give the classification of fuels with examples. **6**
   b) Write short notes on i) octane number ii) cetane number and iii) power alcohol. Mention their applications. **7**
   c) Define HCV and LCV and calculate the HCV and LCV of coal sample using the following data

Weight of coal sample taken	= 0.067 Kg
Weight of water taken	= 1.234 Kg
Water equivalent of calorimeter	= 0.65Kg
Raise in temperature	= 3. 7 ºC
% of H_2 in the sample	= 5.5 %
Lalent heat of steam	= 587 x 4.2 KJ / Kg
Specific heat of water	= 4.2 KJ / Kg / ºC

7

2. a) Define standard electrode potential and explain the origin of single electrode potential. **6**
   b) Explain the construction and working principal of methanol oxygen fuel cell. Mention its applications. **7**
   c) An electro Chemical cell consists of iron electrode dipped in 0.02 M $FeSO_4$ solution and copper electrode dipped in M/10 $CuSO_4$ solution at 313 K. write the cell representation and electrode reactions. Calculate emf of cell, ΔG & ΔG^o. Given that (SOP) $Fe^{2+} / Fe = + 0.44$ V and (SRP) $Cu^{2+} / Cu = + 0.34$ V. R= 8.314 J/K/ mole, F = 96500 coulombs. **7**

3. a) Describe the construction and working principal of Ni – MH battery and mention its applications. **6**
   b) Explain the production of solar grade silicon by crystal pulling technique method and purified by ozone refining. **7**
   c) Discuss the following characteristics of battery,
   i) Voltage ii) Capacity iii) Energy efficiency iv) life cycle v) power density vi) Energy density vii) Shelf life **7**

4. a) What is corrosion? Describe the mechanism of electro chemical corrosion by taking iron as an example. **6**
   b) How corrosion is prevented by proper selection and designing of materials. **7**
   c) Write a short note on Galvanisation and Tinning. Mention their applications. **7**

PART – B

5. a) Distinguish between thermo tropic and lyotropic liquid crystals with example. **6**
   b) What are the advantages of electro – less plating over electro plating? Discuss electro – less plating of copper on PCB. **7**
   c) Write short notes on decomposition potential and polarisation. **7**

6. a) How the following polymers are manufactured? i) polyurethane and ii) bakelite and mention their engineering applications. **6**
   b) Discuss the following properties of cement,
   i) Quality ii) Shrinkage iii) Soundness iv) setting time v) Heat of hydration vi) Strength vii) Acid effect. **7**
   c) Explain the vulcanisation and compounding of rubber. **7**

7. a) Describe the hot lime – soda process of softening of water with reactions. **6**
   b) What is desalination of water? And explain the desalination water by Reverse osmosis. **7**
   c) Discuss the various stages of purification of water for municipal supply. **7**

8. a) What is air pollution? And Discuss sources, ill effects and controls of oxide of sulphur dioxide. **6**
   b) Define COD & BOD. Calculate the COD of the effluent sample when 25 cm^3 of an effluent requires 7.7 cm^3 of 0.01 M $K_2Cr_2O_7$ for oxidation. And molecular mass of $K_2Cr_2O_7 = 294$. **7**
   c) Write short notes on
   i) Acid rain ii) Global warning and iii) Ozone depletion. **7**