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**NEW SCHEME**

**I/II Semester B.E. Degree Examination, Dec.06/Jan. 07**  
**Common to all Branches**  
**Engineering Chemistry**

Time: 3 hrs.]

[Max. Marks:100

**Note: Answer any FIVE full questions, choosing at least TWO questions from each Part A and Part B.**

**PART A**

- 1
  - a. Distinguish between gross and net calorific value of a fuel. (04 Marks)
  - b. What is meant by cracking of petroleum? Explain fluidized bed catalytic cracking. (07 Marks)
  - c. On burning 0.96 grams of a solid fuel in Bomb calorimeter, the temperature of 3,500 grams of water increased by 2.7°C. Water equivalent of calorimeter and latent heat of steam are 385 grams and 587 cal/gram respectively. If the fuel contains 5% H<sub>2</sub>, calculate its gross and net calorific values. (06 Marks)
  - d. Write a note on power alcohol. (03 Marks)
  
- 2
  - a. Define electrode potential and derive Nernst equation for electrode potential. (05 Marks)
  - b. What are the advantages of secondary reference electrodes? Explain the construction and working of Ag/AgCl electrode. (06 Marks)
  - c. What are electrochemical cells? Distinguish primary cells from secondary cells with examples. (05 Marks)
  - d. What are concentration cells? Calculate cell potential of the following cell at 298 K.  
 $\text{Ag} | \text{Ag}^+ (0.001\text{M}) || \text{Ag}^+ (0.50\text{M}) | \text{Ag}$   
 What will be cell potential, when the concentration of silver ions in the above cell is changed from 0.001M to 0.0005 M at same temperature? (04 Marks)
  
- 3
  - a. How does a fuel cell differ from battery? Explain the construction and working of Nickel – metal hydride battery. (08 Marks)
  - b. Explain the construction, working and application of H<sub>2</sub>-O<sub>2</sub> fuel cell, with cell reaction. (06 Marks)
  - c. Give the classification of batteries with examples. (06 Marks)
  
- 4
  - a. Explain stress corrosion with examples. (04 Marks)
  - b. What are corrosion inhibitors? Explain how corrosion is controlled by using anodic and cathodic inhibitors? (07 Marks)
  - c. Write a brief note on the effect of following factors on the rate of corrosion
    - i) Nature of metal
    - ii) Hydrogen – over voltage
    - iii) Relative areas of anode and cathode. (09 Marks)

Contd... 2

**PART B**

- 5 a. What is electroplating? Give the technological importance of metal finishing. (04 Marks)
- b. Explain the following factors influencing the nature of deposit : i) Complexing agents ii) Brighteners iii) Levellers and iv) Wetting agents. (08 Marks)
- c. Discuss the electroless plating of copper on PCB. (04 Marks)
- d. Write a note on over voltage governing the metal finishing. (04 Marks)
- 6 a. Explain the following with examples  
i) Thermotropic liquid crystal and ii) Lyotropic liquid crystal. (06 Marks)
- b. What is homologues series? Explain the liquid crystalline behavior of homologues of MBBA. (06 Marks)
- c. Discuss the instrumentation and applications of conductometric estimation. (08 Marks)
- 7 a. What are adhesives? Explain the synthesis and applications of epoxy resin. (06 Marks)
- b. What are elastomers? Mention the advantages of synthetic elastomers. (04 Marks)
- c. Give the synthesis and applications of butyl rubber. (04 Marks)
- d. Discuss the mechanism of conductance in polyacetylene. (06 Marks)
- 8 a. What is potable water? Discuss the purification of water by reverse osmosis process. (05 Marks)
- b. Explain the method of determining sulphate content in water by gravimetric method. (05 Marks)
- c. Explain the determination of dissolved oxygen by Winkler method. Give the reactions involved. (06 Marks)
- d. Describe the secondary treatment of sewage by activated sludge process. (04 Marks)

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