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NEW SCHEME

CHE12/22

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First/Second Semester B.E Degree Examination, July/August 2005
Engineering Chemistry

Time: 3 hrs.]

[Max.Marks : 100

- Note:** i) Answer any FIVE full questions.
 ii) Draw neat diagrams wherever necessary.
 iii) Answers must be specific and precise.

- What are liquid crystals? Distinguish between smectic, nematic and cholesteric types with suitable examples. (8 Marks)
 - Describe the production of acetone from starch by biochemical process. (8 Marks)
 - Mention the industrial applications of enzymes. (4 Marks)
- Define calorific value of a fuel. Describe the Boy's calorimetric method of determining the calorific value of a gaseous fuel. (8 Marks)
 - A 0.6 gm coal sample with 92% C, 5% H_2 and 3% ash, caused a rise in the temperature of 2000 gm of water by $3.2^{\circ}C$ in a bomb calorimeter experiment. Calculate the gross and net calorific value of coal, given water equivalent = 200 g
 Specific heat of water = $4.187 \text{ kJkg}^{-1} \text{ }^{\circ}C^{-1}$
 Latent heat of steam = 580 calories/gm
 (1 calorie = 4.18 Joules) (8 Marks)
 - Write a note on knocking in IC engines. (4 Marks)
- Derive Nerust equation for the potential of a single electrode from thermodynamic principle. From this, deduce an expression for the e.m.f of a copper concentration cell in which the copper ions ratio is 10. Calculate the emf of this cell at $25^{\circ}C$. (8 Marks)
 - What is glass electrode? How is it constructed? Describe the experimental determination of pH of a solution using glass electrode. (8 Marks)
 - Write a note on hydrogen oxygen fuel cell. (4 Marks)
- Give the construction and working of a Ni-Cd battery. Comment on the capacity and cycle life of a lead acid battery. (8 Marks)
 - The e° values of Li/Li^+ , Zn/Zn^{++} , Cu/Cu^{++} and Ag/Ag^+ are $-3.0V$, $-0.77V$, $+0.33V$ and $+0.80V$ respectively. Which combination of the electrodes you use to construct a cell of highest emf if the ionic concentrations are 0.1M, 1.0M, 10M and 0.01M, in the same order. Justify your answer. (8 Marks)

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5. (a) Explain the electro chemical mechanism of rusting of Iron in humid atmosphere. Mention any four factors that affect the rate of corrosion. (8 Marks)
- (b) Write notes on :
i) Cathodic protection ii) Corrosion inhibitors. (8 Marks)
- (c) Define the terms Decomposition potential and over voltage. (4 Marks)
6. (a) Discuss the effect of temperature, current density throwing power and addition agent on the quality of electrodeposits. (8 Marks)
- (b) Distinguish between electroplating and electroless plating. Describe the electroless plating of copper for the manufacture of PCB. (8 Marks)
- (c) Write a note on electro plating of Nickel. (4 Marks)
7. (a) Describe any two methods of polymerization. Explain the mechanism of addition polymerization of ethylene. (8 Marks)
- (b) Give the synthesis and uses of
i) Epoxy resins ii) Buna - S. (8 Marks)
- (c) Write a note on glass transition temperature. (4 Marks)
8. (a) Discuss briefly the causes, effects and prevention of air pollution. (8 Marks)
- (b) Explain the terms BOD and COD. What are the steps involved in the tertiary treatment of sewage? (8 Marks)
- (c) Write a note on ozone depletion. (4 Marks)

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