

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Seme-IV-Examination-June-2011

Subject code: 141302

Subject Name: Environmental Sciences-II

Date: 08/06/2011

Time: 10:30 am – 01:00 pm

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain Ionization of weak acids with examples. **07**
(b) Explain the phenomena of common ion effect with example. **07**

- Q.2** (a) Equilibrium constants for the complexes between Cd^{+2} and Cl^- are $K_1 = 21$, $K_2 = 8$, $K_3 = 1.2$ and $K_4 = 0.34$. calculate the molar concentration of each of the first four Cadmium Chloride complexes in water sample if $\text{Cd}^{+2} = 10^{-8} \text{ M}$ and $\text{Cl}^- = 0.5 \text{ M}$. **07**
(b) A metal plating waste contains 20 mg/l Cu^{+2} and it is desired to add $\text{Ca}(\text{OH})_2$ to precipitate all but 0.5 mg/l. To what concentration in moles/liter must be hydroxide concentration be increased accomplish this assume K_{sp} for $\text{Cu}(\text{OH})_2$ is 7.87×10^{-6} . **07**

OR

- (b) The solubility product K_{sp} for calcium sulphate in water is 1.96×10^{-4} . Determine the equilibrium Ca^{+2} concentration in mg/l for a saturated calcium sulphate solution. **07**

- Q.3** (a) Give the difference between aliphatic and aromatics compounds and explain why are oxidation reactions of organic compounds important to environmental engineers. **07**
(b) Name the three general classes of synthetic detergents and give examples. **07**

OR

- Q.3** (a) What is the major factor contributing to the difference in bio-degradability of starch and cellulose? Explain in detail. **07**
(b) What is isomerism and explain with structural formulas and molecular formula of C_6H_{14} . **07**

- Q.4** (a) Explain the principles of solvent extraction and derive the formula of how much constituents remains in the aqueous phase after η extractions? **07**
(b) Write a short note on osmosis. **07**

OR

- Q.4** (a) How dilution water for BOD test is prepared in the laboratory? **07**
(b) Determine BOD value of following test data; **07**
 - Sample size taken = 2 ml
 - Blank reading of 0.025 N $\text{Na}_2\text{CO}_3 = 7.5 \text{ ml}$
 - Sample reading of 0.025 N $\text{Na}_2\text{CO}_3 = 4 \text{ ml}$
 - Sample was originally 10% diluted

