Seat No.: _____ *Enrolment No._____*

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. Sem-IV Examination June- 2010

Subject code: 141302

Subject Name: Environmental Sciences -II

Date: 18 / 06 /2010 **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)** The solubility product, Ksp for calcium sulfate ($CaSO_4$) in water at 25^0C is 1.96×10^{-4}. Find the equilibrium Ca^{+2} concentrations for a saturated calcium sulfate ($CaSO_4$) solution of ideal behavior are assumed. **07**

(b) Explain Common Ion Effect with example. **07**

Q.2 **(a)** Describe hydrophilic and hydrophobic colloids with example. **07**

(b) Write short note on Osmosis. **07**

OR

(b) Write short note on Electro dialysis. **07**

Q.3 **(a)** The solubility of picric acid at 20^0C is 9.56g per 100g of benzene & 1.4g per 100g of water. If an industrial wastewater contains 5000 mg/L of picric acid, what concentration would remain after 1 extraction with 1 lb of benzene for each 2 lb of water? **07**

(b) Explain class –II binary mixtures with Sketch. **07**

OR

Q.3 **(a)** Water has following analysis. **07**

mg/l	mg/l
Na^+ - 30	Cl^{--} - 60
K^+ - 05	HCO_3^{--} - 45
Ca^{2+} - 36	CO_3^{2--} - 01
Mg^{2+} - 12	SO_4^{2--} - 60
Sr^{2+} - 01	NO_3^{--} - 02

What is the total hardness, carbonate hardness and non-carbonate hardness in mg/L as $CaCo_3$?

(b) Explain application of alkalinity data. **07**

Q.4 **(a)** Explain principle of solvent extraction. **07**

(b) If the concentration of chromate indicator used is 5×10^{-3} mol/L, how much excess silver ion in mg/L must be present before the formation of red precipitate will begin? **07**

OR

Q.4 **(a)** Explain the biochemistry of **07**
(i) Carbohydrates (ii) Proteins.

Q.4 **(b)** Explain anionic detergents & biological degradation of detergents. **07**

Q.5 **(a)** Give the basic difference between BOD and COD. **07**

(b) What purpose or purposes are served by each of the following in BOD dilution water: **07**

(i) $FeCl_3$ (ii) $MgSO_4$ (iii) K_2HPO_4 (iv) NH_4Cl

OR

Q.5 **(a)** Write the sources of phenolphthalein and mineral acidity. **07**

(b) (i) What factors affect the solubility of oxygen in water? **07**

(ii) Two samples were collected simultaneously at the same port in a river for dissolved oxygen analysis. One sample was fixed immediately after collection, and the other was treated later in the laboratory. Indicate two possible factors that could cause lower results to be obtained in the second sample.

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