**M.TECH. DEGREE EXAMINATION, December 2013**

**Branch: Civil Engineering**

**Specialization : Environmental Engineering**

**Model Question Paper - I**

**First Semester**

**MCEEE 102 ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY**

 (Regular – 2013 Admissions)

Time : Three Hours Maximum : 100 marks

***Instructions: 1) Answer questions in full.***

***2) Assume suitable data wherever necessary.***

1. a) State and Explain Raoult’s law. (5)

b) What are buffer solutions? Explain. Derive Henderson Hasselbalch’s equation for pH of a

 buffer solution. (10)

c) Calculate the pH of a buffer solution prepared with 20 mg/L carbonic acid and 50 mg/L of

 bicarbonate ion, under the following conditions. Assume a closed system.

 i) Initially

 ii) After 3ml of 0.02 N H2SO4 is added

 iii) After 3ml of 0.02 N NaOH is added (10)

**OR**

1. a) State and explain Le Chatlier’s principle. (5)

b) What is the molar concentration of a solution containing 10 g/L of i) NaOH ii) Na2SO4. (5)

c) Explain the different types of adsorptions. (5)

d) Briefly explain:

 i) Zeta Potential

 ii) Osmosis

 iii) Principle of Solvent extraction (10)

1. a) What is the relationship between i) pH and hydrogen ion activity

 ii) pH and hydroxyl ion activity (5)

b) Explain the three major kinds of alkalinity found in natural waters. (5)

c) Discuss the principles involved in the EDTA titrimetric method of measuring hardness. (5)

d) Explain the importance of following parameters in water analysis.

 i) BOD ii) COD iii) DO (10)

**OR**

1. a) Give the applications of COD analysis in environmental engineering. (5)

b) Explain the environmental significance of iron and manganese in water supplies. (5)

c) Briefly explain anyone method for determination of chloride concentration in water. (5)

d) Discuss the i) acid – base reaction and ii) Ion exchange reaction in soil. (10)

1. . a) Define Microbiology. What are the major characteristics of a microorganism?

(10)

 b) How can you examine a microorganism using wet mount technique? Explain a type of differential stain used to identify microorganisms. (15)

 **OR**

1. a) List out the microorganism involved in contamination of water. Name some of the water borne diseases and their causative agents. (10)

 b) What is membrane filter technique? Explain a method (MPN TECHNIQUE) for testing faecal contamination in water samples. (15)

1. Explain how biotechnology is applied in waste treatment and how is it beneficial to mankind? (25)

**OR**

1. Define sterilization, factors influencing sterilization, its principles and methods.

(25)