Reg. No.										

Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)

I SEMESTER M.TECH (ENVIRONMENTAL ENGINEERING)

END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: APPLIED ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY (CIE 523)

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

1A.	Distinguish between metals and nonmetal based on their chemical properties.	**04**
1B.	What tank volume is required to hold methane gas at 25^0 C and 2 atm.	**02**
1C.	State Lechtelier's principle. Explain various stress that disturb the equilibrium.	**04**
2A.	Explain oxidation reduction reaction and discuss its significance in environmental field.	**03**
2B.	State graham's law and mention its application in environmental engineering field	**03**
2C.	Calculate (i) The equivalent weight of Ca^{2+} ion. (ii) Equivalent weight of $CaCO_3$ (iii) what is the concentration of 20 mg/L of Ca^{2+} when expressed as $CaCO_3$.	**04**
3A.	Discuss briefly zero order reaction and its application in environmental engineering field.	**04**
3B.	Discuss the working principle of reverse osmosis.	**03**
3C.	Following are the data from an experiment to assess the disinfection of water supply with a given dose of chlorine. Assuming first order kinetics determine the rate constant. Time ,min — % coliform bacteria 0 — 100 10 — 70 20 — 21 30 — 6.3 60 — 0.6	**03**

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4A.	Explain lime soda method in water softening process.	**03**
4B.	Discuss Langmuir adsorption isotherm. Mention the assumptions made in Langmuir adsorption isotherm.	**03**
4C.	A coagulation treatment plant with a flow of 0.7 m^3/ s is dosing alum at 27 mg/l. No other chemicals are being added. The raw water suspended solid concentration is 47 mg/l. the effluent suspended solid concentration is measured as 15 mg/l. the sludge content is 1% and the specific gravity of sludge is 3.01. What volume of sludge must be disposed of each day?	**04**
5A.	Explain the different types of indicator used in volumetric analysis.	**04**
5B.	With a neat sketch explain the working of HPLC.	**03**
5C.	Mention the classification of enzymes explaining each.	**03**
6A.	With a neat sketch explain the structure of bacteria.	**04**
6B.	Discuss the importance of algae for environmental engineering.	**03**
6C.	Write a short note on (i) Intracellular and extracellular enzyme (ii) Glycolytic pathway of microbial metabolism.	**03**