Reg. No.										

MANIPAL INSTITUTE OF TECHNOLOGY

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I SEMESTER M.TECH. (ENVIRONMENTAL ENGINEERING)
END SEMESTER EXAMINATIONS, NOV/DEC 2016

SUBJECT: **APPLIED ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY**
[CIE 5122]

REVISED CREDIT SYSTEM

Time: 3 Hours MAX. MARKS: 50

Instructions to Candidates:

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

1A.	What are catalysts? Explain how a catalyst changes the rate of reaction. With examples mention the use of catalysts in control of air pollution.	**04**
1B.	Explain the solubility product and its significance in Environmental Engineering.	**03**
1C.	Calculate the volume of tank required to hold 5000 kg of carbon dioxide gas at 40°C and 1.5 atm pressure.	**03**
2A.	State and mention the application in Environmental Engineering field of (i). Henry's law (ii).Dalton's law of partial pressure.	**04**
2B.	Discuss briefly the effects of liquid ionic strength and separating distance between colloids on the force of interaction between them.	**03**
2C.	Explain the reaction of metals with water and oxygen.	**03**
3A.	Explain the principle of solvent extraction.	**04**
3B.	Write a note on (i) Pseudo first order reaction (ii) Consecutive reactions.	**04**
3C.	The half-life of atrazine (an herbicide) is estimated to be approximately 14 days. What fraction of the initial atrazine will remain after 100 days?	**02**
4A.	With a neat sketch explain the working of Gas chromatography.	**03**
4B.	Granular Activated Carbon (GAC) was tested for its ability to remove soluble organic matter from treated wastewater. Different masses of GAC were added to 1L of the wastewater and it is contacted for 20h at 20° C and pH = 7.5. Initial concentration of soluble organic content is 1.0 mg/1. Derive the equation for Langmuir adsorption isotherm using the data given below.	**05**

Mass of GAC added (mg)	C, mg/L of organic matter
0.2	0.8
0.5	0.75
2.0	0.35
5.0	0.19
10	0.14
20	0.09
50	0.06

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4C.	The soil sample contains Benzene of 5 mg/1. What is the concentration in ppm if the density of soil is 1.8 g/ cm^3?	**02**
5A.	With a neat sketch of bacterial growth curve explain the different phases of bacterial growth.	**03**
5B.	Discuss the different types of bacteria based on their shape.	**03**
5C.	List the various glycolytic pathway of microbial metabolism. Explain with sketch anyone	**04**