

06CE6023

Reg. No \_\_\_\_\_

Name \_\_\_\_\_

**A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY**

**M.TECH DEGREE EXAMINATION, DECEMBER 2015**

**FIRST SEMESTER**

**Branch: Civil Engineering**

**Specialization: Environmental Engineering**

**Environmental chemistry and microbiology**

**Time: 3 Hours**

**Max. Marks: 60**

**PART A**

*Answer ALL questions*

1. What is the difference between ideal gas equation and van der waal's gas equation ? Real gases do not obey ideal gas equation , especially at very high pressure and very low temperature. Why ?
2. Give an account of all the theoretical aspects regarding Gas chromatography
3. (a) Classification of organism on the basis of flagellar arrangement  
(b) Briefly explain the Widal slide test (5 marks)
4. What is eutrophication? How does it form? How is it related to water pollution (5 marks)

**(4 x 5 marks =20 marks)**

**PART B**

- 5 a) With the help of examples discuss order and molecularity of a chemical reaction(5 )  
b) Give the important aspects regarding the stability of colloids . What do you mean by gold number?(5)
- OR
- 6 a) What is Le Chatelier's principle. Describe the effect of temperature, pressure and concentration for the reaction  $2 \text{SO}_2 + \text{O}_2 \rightarrow 2 \text{SO}_3 + 193.2 \text{ kJ}$ (5)  
b) What is Henry's law ? Give three applications of Henry's law(5 )
  - 7 a ) What is H bonding ? How does this phenomenon save many aquatic biota in polar region (5)  
b) Give an account of salt affected soil and it's remediation (5 )

OR

8 a) Explain the analysis of Fe and Mn in water (5 )

b) Give the theory and important characteristics of HPLC (5 )

9 What are coliforms? Explain any two methods for examination of faecal contamination in water samples (MPN Method and Membrane Filter technique)

OR

10 Explain soil microbiology, microorganisms involved in soil and various interactions among them.

11 Explain the chemical agents participating in sterilization and disinfection.

OR

12 With suitable examples explain microbial production of industrial products

**(4 x 10 marks =40 marks)**

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**A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY****M.TECH DEGREE EXAMINATION, DECEMBER 2016****FIRST SEMESTER****Branch: Civil Engineering****Environmental Chemistry and Microbiology****Time: 3 Hours****Max. Marks: 60****PART A***Answer ALL questions*

1. What is Raoult's law? Suggest the reasons for the deviations of binary solutions from this law, with examples and illustration with graphical method
2. Write the phenomenon of cation exchange reaction in soil with examples
3. Explain the practical significance of various microorganisms.
4. Briefly explain bioremediation.

**(4 x 5 marks =20 marks)****PART B**

5. a) Explain the concept of law of chemical equilibrium. What are the characteristics of equilibrium constant? (5 marks)
- b) What are buffer solutions? Explain. Derive Henderson-Hasselbalch's equation for pH of a buffer solution. (5 marks)

**OR**

6. a) Differentiate between physiosorption and chemisorptions. (5 marks)
  - b) Give a brief account of stability of colloids. (5 marks)
7. a) What is the principle of ion exchange chromatography. How is it different from adsorption chromatography? (5 marks)
  - b) Discuss the important aspects of HPLC. (5 marks)

OR

8. a) Discuss the principle involved in the EDTA titrimetric method of measuring Hardness. (5 marks)

b) Describe the method of determination of sulphide ions in water. (5 marks)

9. Explain the procedure for wet mount technique and gram staining technique with suitable figures.

OR

10. Explain microbiology of air.

11. Explain the role of microorganisms in suspended growth process.

OR

12. Explain various bio energy conversion techniques.

**(4 x 10 marks =40 marks)**

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**A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY****M.TECH DEGREE EXAMINATION, DECEMBER 2017****FIRST SEMESTER****BRANCH : CIVIL - ENVIRONMENTAL ENGINEERING****ENVIRONMENTAL CHEMISTRY AND MICROBIOLOGY****Time: 3 Hrs****Maximum Marks: 60****PART A***Answer ALL questions**4 X 5 Marks*

1. What are buffer solutions ? Suggest the effect of adding an acid or base in moderate amounts to an acid buffer and a basic buffer. Give reasons for your answer with suitable examples.
2. Describe the principle for the analysis of iron and manganese in water.
3. How can you examine a microorganism using wet mount technique? Explain with a figure.
4. How the Superbug was created by transfer of plasmids?

**PART B***4 X 10 Marks*

5. a) What will happen to a reversible reaction at equilibrium when i) temperature is raised, given that it is exothermic ii) temperature is lowered given that it is endothermic ii) pressure is lowered, given that the number of moles of products is greater than that of reactants.  
b) State the law of chemical equilibrium. What are the important characteristics of this law ?  
c) Describe the factors that contribute to the stability of colloids. **(4+3+3)**

**OR**

6. a) Based on Le Chatelier's principle predict the effect of temperature, pressure and concentration on contact process ( $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3 + 193.2 \text{ kJ}$ ).

b) Define the law of chemical equilibrium. Derive an expression for equilibrium constant for the general reaction  $A+B \rightarrow C+D$ , based on the law of mass action.

c) On the basis of molecular interactions, explain why the non ideal solutions deviate from Raoult's law. **(4+3+3)**

7. a) Write down the theoretical aspects regarding TLC. Bring out the importance of  $R_f$  values in TLC with the help of an example.

b) Write down the principle for the determination of BOD & DO in water.

c) Discuss the phenomenon of cation exchange reaction in soil with examples. **(4+3+3)**

**OR**

8. a) Give a brief description of separation of components in a mixture using HPLC, including elution technique.

b) Discuss the principle involved in the EDTA titrimetric method for the determination for measuring hardness of water.

c) Differentiate between the terms ESP and SAR in connection with salt affected soil. **(4+3+3)**

9. a) Explain any six soil factors which influence the microbial population, distribution and activity in soil.

b) Which are the four methods through which bioaerosol deposition occurs? **(6+4)**

**OR**

10. a) Bacteriological examination of water should be conducted in a routine basis for a large volume of sample. Suggest a method for this & explain the procedure.

b) Briefly explain the municipal-water purification procedure with a flow diagram. **(6+4)**

11. a) Explain the microbial production of any two industrial products.

b) How biogas is produced? Explain with a flow diagram. **(6+4)**

**OR**

12. a) How sewage is treated using a facultative pond?

b) Explain the properties of an ideal disinfectant. **(6+4)**

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Exam Slot: B

Reg Number.....

Name.....

**A P J ABDUL KALAM TECHNOLOGICAL UNIVERSITY  
M.TECH DEGREE EXAMINATION, DECEMBER 2018  
FIRST SEMESTER**

**ENVIRONMENTAL ENGINEERING  
Environmental Chemistry and Microbiology**

**Time: 3 Hrs**

**Maximum Marks:60**

**PART A**

*Answer ALL Questions*

1. What do you mean by distribution law? Give a brief description of any three of the applications of distribution law.
2. Give the principle and instrumentation of GC. Give a neat sketch of a gas chromatogram.
3. Define aero-microbiology and explain various sources of microorganisms in air.
4. Define sterilization, factors influencing efficiency of sterilization, and list some physical and chemical sterilizing agents.

**4 x 5 marks = 20 marks**

**PART B**

5. a) State the law of chemical equilibrium. What are the important characteristics of this law? **(4 marks)**  
b) Define Grahams law. Give three important applications of the law. **(3 marks)**  
c) Give the important aspects regarding the stability of colloids. What do you mean by gold number? **(3 marks)**

OR

6. a) What do you mean by order and molecularity in chemical kinetics? Bring out the differences between order and molecularity **(4 marks)**  
b) What are buffer solutions? Suggest the effect of adding an acid and base in moderate amounts to a buffer solution, with suitable examples. **(3 marks)**  
c) What is Le Chateliers principle? Describe the effect of temperature, pressure and concentration for the reaction  $2\text{SO}_2 + \text{O}_2 \rightarrow 2\text{SO}_3 + 193.2 \text{ kJ}$ . **(3 marks)**

7. a) What is the principle of ion exchange chromatography. How is it different from adsorption chromatography? **(4 marks)**  
b) Write down the principle and outline for the determination of chloride ions in water. **(3 marks)**  
c) Define Eutrophication and explain its relation with water pollution. **(3 marks)**

OR

8. a) Discuss the principle involved in the EDTA titrimetric method of measuring hardness. **(4 marks)**  
b) What is H bonding? How does this phenomenon save many aquatic biota in polar region? **(3 marks)**  
c) Write down the phenomenon of cation exchange reaction in soil with an example. **(3 marks)**
9. a) List different types of staining techniques and explain any one differential staining technique. **(4 marks)**  
b) Explain the multiple tube fermentation technique for the bacteriological analysis of water. **(6 marks)**

OR

10. a) Explain the characteristics and various classifications of bacteria. **(5 marks)**  
b) Write the bacteriological standards of drinking water and treated wastewater. **(5 marks)**
11. a) Explain the microbial production of cheese and bread. **(5 marks)**  
b) How bioremediation is done by land farming method and composting method? **(5 marks)**

OR

12. a) Explain any five biofuels derived from biomass. **(5 marks)**  
b) How biological treatment of wastewater occur in trickling filters? **(5 marks)**

**4 x 10 marks = 40 marks**