



MANAV RACHNA
||vidyanatariksha||

MANAV RACHNA
UNIVERSITY

(FORMERLY MANAV RACHNA COLLEGE OF ENGINEERING
NAAC ACCREDITED 'A' GRADE INSTITUTION)

Declared as State Private University under section 2f of the UGC act, 1956

DEPARTMENT OF CHEMISTRY

"T3, EXAMINATION, MAY 2017-18"

Semester: Second
Subject: Green Chemistry
Branch: CSE
Course Type: Core
Time: 3 Hours
Max. Marks: 80

Date of Exam: 18/05/2018
Subject Code: CHH 101-T
Session: I
Course Nature: Hard
Program: B.Tech
Signature: HOD/Associate HOD:

Note: All questions are compulsory in part A, attempt any two questions each from part B and part C.

Part A

- Q.1 Answer the following in brief 2 each
- Draw the structure of EDTA – ion complex and EBT indicator.
 - A sample of water contains 250 mg of $MgCl_2$ per litre. Determine its hardness in terms of $CaCO_3$ equivalent.
 - What do you mean by specificity of enzymes?
 - Explain the important properties of water to be used as green solvent.
 - What are Phase transfer catalysts? Write their importance?
 - What is the role of Dow chemical company in advancement in green engineering?
 - What is the need of green engineering?
 - Write a note on energy star label.
 - What is the role of bamboo in greener approach to computing?
 - Explain life cycle assessment in green engineering.

Part B

- Q.2 a) Write short notes (including properties and uses) on 3 each
- Singlet and triplet oxygen
 - Ionic liquids
 - Liquid polymers
- b) Standard hard water is prepared by dissolving 250mg of $CaCO_3$ in 1L of water. 50ml of this solution needs 20ml of EDTA to get the end point. 50ml of water sample requires 25 ml of the same EDTA solution to get the end point and 50ml of boiled water requires 15ml of EDTA solution to get the end point with EBT indicator. Calculate temporary, permanent and total hardness. 6
- Q.3 a) Draw the labeled phase diagram of one component system (water) and explain all its characteristics in detail. 8
- b) Explain the preparation of the following 2 each
- Adipic acid

ii. Ibuprofen

c) A water sample is alkaline to both phenolphthalein and methyl orange. 100ml of this sample required 4ml N/50 H₂SO₄ for phenolphthalein end point and 16ml of same acid to get the methyl orange end point. Calculate the type and amount of alkalinity present. 3

Q.4 a) Give detailed estimation of alkalinity and explain the alkalinity table. 12

b) NH₄Cl (s) \longleftrightarrow NH₃(g) + HCl(g) , determine its number of components, phases and degree of freedom. 3

Part C

Q. 5 Discuss US Presidential Green Chemistry Challenge Awards on the basis of their focus areas with detail example. 15

Q. 6 a) What do you mean by composite materials? Describe bio based composite resin designs for electronic materials. 3,6

b) Discuss the basic principles of green engineering. 6

Q. 7 a) Discuss the case study of Sony Ericsson. How this case study is helpful in green Engineering? 10

b) Explain how the use of green chemicals can eliminate the use of hazardous chemicals. 5