

Roll No. ....

Total Pages : 3

BT-2/M-13

8211

**CHEMISTRY**

(2005 Onwards)

Paper-CH-101-E

Time Allowed : 3 Hours]

[Maximum Marks : 100

**Note :** Attempt **five** questions in all, selecting at least **one** question from each Unit. All questions carry equal marks.

**UNIT-I**

1. (a) Define entropy. Derive an equation for entropy change for an ideal gas. 10  
(b) Write short notes on any **two** :
  - (i) Chemical potential
  - (ii) Work function and various forms of the expression of second law of thermodynamics. 10
2. (a) Discuss the various phase equilibria, areas and points involved in the phase diagram of water system. Justify your answer with a neat, labelled sketch. 10  
(b) Describe the following terms frequently used in phase equilibria :  
Phase, Components, Degree of freedom, Eutectic point, Metastable curve and Incongruent melting point. 10

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## UNIT-II

3. (a) What are the various units of hardness? Write a relationship amongst these. Why are the results in water treatment expressed in terms of ppm as  $\text{CaCO}_3$ ? 5
- (b) What is meant by alkalinity? How is it estimated by acid-base titration method? 8
- (c) An alkaline water sample (A) responds to phenolphthalein as well as methyl orange indicator. 100 ml of the above sample consumes 25 ml of N/50 HCl upto phenolphthalein end point and the resulting solution consumes another 10 ml of the same acid upto methyl orange end point. Deduce the types of alkalinities and their amounts in ppm as  $\text{CaCO}_3$  equivalents. 7
4. (a) What is meant by internal conditioning of boiler-feed water? Justify your answer with the carbonate conditioning method. 10
- (b) Write short notes on any two :
- (i) Disinfection of water
  - (ii) Desalination of water (electrodialysis)
  - (iii) Softening of water (ion exchange process). 10

## UNIT-III

5. (a) Discuss the various factors responsible for the corrosion of metals. 8

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- (b) Write short notes on any **three** :
- (i) Pitting corrosion
  - (ii) Water line corrosion
  - (iii) Stress corrosion
  - (iv) Differential aeration corrosion. 12
6. (a) Discuss the important properties of lubricants. Explain the mechanism of extreme pressure lubrication. 8
- (b) What is meant by saponification value? For what purpose is it determined? 7
- (c) What is drop point? How is it determined? Discuss the significance of drop point. 5

#### UNIT-IV

7. (a) Differentiate between chain growth and step growth polymerisation processes. Justify your answer by taking 4 examples in each case. 6
- (b) Discuss the cationic mechanism of chain growth polymerisation. 6
- (c) Discuss the preparation, properties and the technical uses of phenol-formaldehyde resin. 8
8. (a) Describe the basic principle involved in differential thermal analysis. Discuss in brief the working of above method for the estimation of occluded solvent molecules in the given sample. 10
- (b) Describe the principle and working of flame photometer. Write its applications and drawbacks. 10