MAY 2009 1

Roll No. 1606172 Total No. of Pages : 3

BT-2/M09 9054

Chemistry (New)

Paper : CH - 101 E

Time : Three 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) Give three statements of Second Law of Thermodynamics. 3

(b) Prove that :-

$$\Delta S = nC_v \ell n \frac{T_2}{T_1} + n R \ \ell n \frac{V_2}{V_1}$$

where all symbols have usual meanings. 5

(c) Derive the Clausius-Clayperon equation in its integrated form. 5

(d) What do you mean by chemical potential ? Give its physical significance. 3

(e) The free energy change (ΔG) accompanying a given process is – 85.77 kJ at 25°C and –83.68 kJ at 35°C. Calculate the change in enthalpy (ΔH) for the process at 30°C. 4

2. (a) Derive an expression for Gibb's phase rule equation. 5

(b) Differentiate with suitable examples the congruent and incongruent melting solids. 3

(c) Explain a two component system involving the formation of a eutectic solid. What is an important application of this system ? 7

(d) The Fusion curve in water system has a negative slope while in sulphur system it has a positive slope. Explain 3

(e) Define phase and component. 2

UNIT–II

3. (a) Define hardness. How is it expressed ? Give various units of hardness and relation between them. 5

(b) 50 ml of an alkaline water sample required 20 ml $\frac{N}{50}$ H_2SO_4 for phenolphthalein end point and another 5 ml for methyl orange indicator i.e. complete neutralisation. Describe the type of alkalinity and calculate in terms of $CaCO_3$ equivalents. 5

(c) Differentiate between scales and sludges. 3

(d) Give the name and structure of indicator used in EDTA titration for hardness estimation. How is required pH obtained ? 3

(e) What is internal conditioning in boilers ? Explain Calgon conditioning. 4

4. (a) What is Saline Water ? Explain the process of reverse osmosis for desalination of water. 5

(b) What are various techniques for removing hardness from water ? Explain the method which gives best results. 8

(c) Give important characteristics of potable water. 3

(d) Write a short note on break point chlorination. 4

UNIT–III

5. (a) What is Corrosion ? Explain the mechanism of electrochemical corrosion. 5

(b) Write short notes on :-

(i) Stress corrosion

(ii) Water line corrosion. 6

(c) How rate of corrosion is affected by : position of metal in galvanic series, nature of oxide film and ratio of cathodic to anodic area ? 6

(d) How galvanisation differs from tinning ? 3

6. (a) Explain extreme pressure lubrication. 5

(b) What are greases ? Under which conditions are they used ? Discuss drop point test for greases. 6

(c) Which additives are used in lubrication as :-

(i) Viscosity index improvers

(ii) Pour point depressants.

(iii) Oxidation resistants. 3

(d) Define and give significance of :-

(i) Saponification value

(ii) Flash and Fire points. 6

UNIT–IV

7. (a) Give the mechanism of cationic chain growth polymerisation. 5

(b) Discuss the preparation, properties and use of a thermosetting polymer. 6

(c) What are Silicones ? Give some of their important applications. 4

(d) What do you mean by 'functionality' of monomer ? 2

(e) Write a short note on glass reinforced plastics. 3

8. (a) Discuss the principle and working of differential thermal analysis (DTA) technique. Also give its applications. 8

(b) What are conductometric titrations ? Describe the conductometric titration of a weak acid with a strong base. 6

(c) Write an essay on Flame photometry. 6