

DEC 2011 1

Roll No. ....

Total No. of Pages : 3

BT-1/D11 7524

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) Define the term entropy. Write the mathematical formulation for the entropy change involved in conversion of  $\text{H}_2\text{O}(l) \rightleftharpoons \text{H}_2\text{O}(g)$ . No derivation is required. 5
- (b) How does entropy change occur for an ideal gas when there is a variation in :
  - (i) Temperature and volume at constant pressure,
  - (ii) Temperature and pressure at constant volume. 8
- (c) Water boils at 373 K at one atmospheric pressure. At what temperature will it boil when the pressure is changed to 528 mm of Hg ? Given : the latent heat of water = 2.28 kJ/gm. 7
2. (a) Explain the following terms :-  
phase, components, degrees of freedom, triple point and eutectic system. 10
- (b) What is phase rule ? With the help of a neat labelled sketch, describe the various phase equilibria, points and areas involved in sulphur system. 9
- (c) Name the metallurgist who introduced the term eutectic in the description of the various phase equilibria involved in a two component systems. 1

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UNIT-II

3. (a) Define the term : hardness of water. How does temporary water hardness introduce in water ? Why is the hardness of water expressed in terms of  $\text{CaCO}_3$  equivalents ? 7
- (b) What are the main disadvantages of hard water used in boiler ? Mention briefly the formation of scale and sludge. 6
- (c) 100 ml of a water sample consumed 20 ml of 0.01 N HCl in the presence of phenolphthalein indicator. The resulting solution consumed another 10 ml of the same acid in the presence of methyl orange indicator. Calculate the various types of alkalinities present in the above alkaline water sample in ppm as  $\text{CaCO}_3$  equivalents. 7
4. (a) What is meant by softening of hard water ? Describe the working of an ion exchange process for the softening of hard water. How is exhausted ion exchanger regenerated ? Illustrate your answer with chemical reactions involved in these. 10
- (b) Name the various coagulants. Describe their mechanism in the purification of water. 3
- (c) Describe reverse-osmosis process for desalination of water. 7

UNIT-III

5. (a) Explain the term : electrochemical corrosion. Discuss the mechanism of rusting of iron . 10
- (b) What is sacrificial protection and how does it carried out ? 5
- (c) What is Stress Corrosion ? Mention the various factors responsible for its occurrence. 5

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6. (a) Define lubricants and describe their important functions. 8  
(b) How do the extreme pressure additives work ? 4  
(c) Write short notes on the following properties related with a common lubricant :-  
(i) drop point and (ii) saponification value. 2×4

UNIT-IV

7. (a) Discuss the following terms :-  
(i) Addition polymerisation  
(ii) Tacticity of polymers  
(iii) Vulcanization of rubber. 10  
(b) Discuss the preparation, properties and technical applications of any one thermoplastic polymer. 10
8. Write a self-explanatory note on any two :-  
(i) Flame photometry  
(ii) Thermogravimetric analysis  
(iii) Conductometric titrations and  
(iv) Differential Thermal analysis. 2×10