

Roll No. Total Pages : 3

BT-2/M-14 8211

CHEMISTRY

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) Derive Gibb's-Helmholtz equation in terms of Gibb's free energy and enthalpy. 12
- (b) What are the limitations of first law of thermodynamics. Justify the need of second law. 8
2. (a) Define the following terms with suitable examples :
 - (i) Phase
 - (ii) Component
 - (iii) Degree of freedom. 9
- (b) Draw a neat labelled phase diagram of water system and explain areas, curves and triple point in it. 11

UNIT-II

3. (a) Explain the causes of hardness of water. 3

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(b) A water sample contains 204 mg of CaSO_4 per litre. Calculate the hardness in terms of CaCO_3 equivalent. 5

(c) Explain scale and sludge formation. How can scale formation be prevented by : (i) phosphate conditioning, (ii) Carbonate conditioning. 12

4. (a) What are ion-exchange resins? How will you purify water by using the resins? What are the advantages of this method over other methods? 10

(b) Write notes on :

(i) Mixed bed demineralisation

(ii) Reverse osmosis. 10

UNIT-III

5. (a) Define corrosion of metals. What are different types of corrosion? Explain the electrochemical theory of wet corrosion, giving its mechanism. 10

(b) Discuss the various (any three) factors affecting rate of corrosion. Mention different methods used to prevention of corrosion of metal. Discuss any one method. 10

6. (a) What is meant by lubricants? Explain the mechanism of lubrication. 5

(b) Write short notes on :

(i) Viscosity index

(ii) Flash point and fire point

(iii) Saponification value. 9

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- (c) What are various additives used in the preparation of lubricating oils? 6

UNIT-IV

7. (a) What are the effect of structure on the properties of polymers? 8
(b) How thermoplastic is differ from thermosets? How phenol-formaldehyde resin is prepared? Give its important applications. 8
(c) What are silicones? How are they prepared? 4
8. (a) What is spectrophotometry? Discuss the principle and working of a spectrophotometer with the help of a schematic diagram. 8
(b) What do you understand by titrimetric analysis? Why titrimetric methods have great advantages over gravimetric methods? 5
(c) What is flame photometry? Describe its applications and drawbacks. 2,5