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BT-2/M-20 **32023**

CHEMISTRY
Paper–AS-103N

Time : Three Hours] [Maximum Marks : 75

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

UNIT–I

1. (a) Derive the Gibb's-Helmholtz equation and describe its significance. 7

(b) Entropy change for an irreversible process is always greater than zero. Explain. 4

(c) Calculate the change in entropy for one mole of an ideal gas when its temperature rise from 300 K to 600 K under

(i) Isochoric condition.

(ii) Isobaric condition.

(Given, C_v = 2.5 R and C_p = 3.5 R) 4

2. (a) Define following terms with suitable examples :

(i) Phase Rule.

(ii) Eutectic Point.

(iii) Phase.

(iv) Incongruent Melting Point. 8

(b) Draw and explain the phase diagram of Zn-Mg system. 7

UNIT–II

3. (a) Write the full form of EDTA. 20 ml of standard hard-water (containing 1.5 g $CaCO_3$ per litre) required 25 ml EDTA solution in the presence of ammonical buffer and EBT indicator. Then 100 ml of water sample required 20 ml of some EDTA and 100 ml of the water sample after boiling required 10 ml of same EDTA under similar experimental conditions. Find out temporary and permanent hardness of water sample. 6

(b) Define desalination of water. Name and explain the methods used for desalination. 9

4. What is the need of Alternate solvents ? Write a note on the following :

(a) Ionic liquids.

(b) Derivatized and immobilized solvents.

(c) Super critical fluids. 15

UNIT–III

5. (a) How cathodic and Anodic methods are helpful in preventing the corrosion of metals ? 6

(b) Explain the following with example :

(i) Stress corrosion.

(ii) Water line corrosion. (5+4=9)

6. (a) Graphite can be used as a lubricating material. Why ? 4

(b) What are Grease ? How are they prepared ? 4

(c) Explain the following properties of lubricants :

(i) Consistancy of Grease.

(ii) Saponification No. of lubricant. (3+4=7)

UNIT–IV

7. (a) What are nanomaterials ? Classify them on the basis of their dimensions. 4

(b) Explain the properties, types and applications of Fullerene. 5

(c) What are nano composites ? Write a note on them. 6

8. Define ceramics. Write a note on following ceramic material

(a) Silica.

(b) Clay.

(c) Feldspar. 15