

(i) Printed Pages : 3

Roll No. ....

(ii) Questions : 9

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**B.A./B.Sc. (General) 4<sup>th</sup> Semester**

**1046**

**CHEMISTRY (Same for B. Sc. Microbial & Food Technology)**

**Paper–XIII : Inorganic Chemistry-B**

**Time Allowed : Three Hours]**

**[Maximum Marks : 22**

**Note :** Attempt five questions in all — One question from each Unit.  
Question No. IX is compulsory.

**UNIT-I**

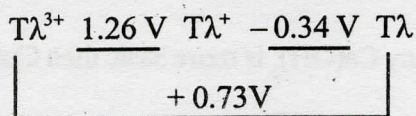
- I. (a) Why separation of Lanthanides is difficult ? Discuss the ion exchange method for the separation of Lanthanides.
- (b)\* What are transuranium elements ? Give examples. 3,1
- II. (a) Compare the following properties of lanthanides with actinides
- (i) Oxidation States
- (ii) Complex formation
- (iii) Tendency to form  $O \times O$  - anions.
- (b) Explain any  $Ca(OH)_2$  is more basic than  $Cu(OH)_2$ . 3,1

## UNIT-II

- III. (a) Explain the relative basicity of pyridine, 2 - methyl pyridine and 4 - methyl pyridine with respect to Lewis Acid B (CH<sub>3</sub>)<sub>3</sub>.
- (b) What are Amphoteric substances ? Explain with an example giving reactions. 2,2
- IV. (a) Trimethylamine is more basic than NH<sub>3</sub>. Explain.
- (b) Arrange the following in order of their increasing pK<sub>a</sub> values and also give reasons : HClO<sub>1</sub>, HClO<sub>2</sub>, HClO<sub>3</sub>, HClO<sub>4</sub>.
- (c) What is Lux-Flood System of Acids and Bases ? Explain with an example. 1½, 1½, 1

## UNIT-III

- V. (a) What is the significance of Pourboix Diagram ?
- (b) The reduction potentials are :
- $\text{Cu}^{2+} + \text{e}^- \rightarrow \text{Cu}^+ \quad E^0 = +0.15\text{V}$ ,  $\text{Cu}^+ + \text{e}^- \rightarrow \text{Cu} \quad E^0 = +0.50\text{V}$ . Calculate the value for  $\text{Cu}^{2+} \rightarrow \text{Cu}$  and draw Latimer diagram. Also predict whether Cu<sup>+</sup> is unstable w.r.t. disproportionation in aqueous solution or not. 1,3
- VI. (a) What is Frost diagram ? Construct a Frost Diagram from given Latimer diagram for Thallium :





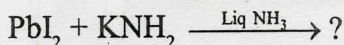
- (b) What do you understand by the term redox stability in water ?  
3,1

#### UNIT-IV

- VII. (a) Discuss the Autoionisation of liquid  $\text{SO}_2$  as a non-aqueous solvent. Explain acid-base reactions in it.
- (b) What are the species characteristics of Acids and Bases in Liquid  $\text{NH}_3$  ?  
3,1
- VIII. (a) In what respect Liquid  $\text{NH}_3$  is a better solvent than water ?
- (b) Explain why Liquid  $\text{SO}_2$  is a better solvent for organic compounds.  
3,1

#### UNIT-V

- IX. (a) Which Lanthanide is radioactive ?
- (b) Name the element which is formed by  $\beta$ -decay of Neptunium.
- (c) Classify as Lewis acid and Lewis base -  $\text{Ni}^{2+}$ ,  $\text{OH}^-$ .
- (d) In the reaction  $\text{SnCl}_2 + 2 \text{HgCl}_2 \rightarrow \text{SnCl}_4 + \text{HgCl}_2$  label the Oxidizing and reducing agent.
- (e) Complete the reaction :



- (f) What is the oxidation state of Uranium in  $\text{UO}_2^{2+}$  and  $\text{UO}_2^+$  ?  
 $1 \times 6 = 6$