

(i) Printed Pages : 3

Roll No. ....

(ii) Questions : 9

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B.A./B.Sc. (General) 5th Semester

(2125)

CHEMISTRY

(Same for B.Sc. Microbial and Food Technology)

Paper—XVII Inorganic Chemistry-A

Time Allowed : Three Hours]

[Maximum Marks : 22

Note :— Attempt FIVE questions in all selecting at least ONE question from each Unit. Q. No. 9 of Unit V is compulsory.

UNIT—I

1. (a) What is Crystal Field Theory? How does it differ from valence bond theory? How does the theory account for the fact that  $[\text{CoF}_6]^{3-}$  is paramagnetic while  $[\text{Co}(\text{NH}_3)_6]^{3+}$  is diamagnetic?  
(b) Why is anhydrous  $\text{CuSO}_4$  colorless? 3,1
2. (a) Explain which of the following complexes has higher crystal field splitting of d-orbitals and why?
  - (i)  $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$  or  $[\text{Co}(\text{H}_2\text{O})_6]^{3+}$
  - (ii)  $[\text{Co}(\text{NH}_3)_6]^{3+}$  or  $[\text{Rh}(\text{NH}_3)_6]^{3+}$
  - (iii)  $[\text{Co}(\text{CN})_6]^{3-}$  or  $[\text{Co}(\text{NH}_3)_6]^{3+}$(b) All tetrahedral complexes are high spin complexes. Explain. 3,1

## UNIT—II

3. (a) Differentiate between Thermodynamic stability & kinetic stability of complexes with examples.
- (b) Discuss how the nature of ligand affects the stability of complexes. 2,2
4. (a) "Substitution in square planar complexes proceeds with retention of configuration." Explain.
- (b) Explain the following terms :
- (i) Associative pathway and dissociative pathway in substitution reactions.
- (ii) Labile and inert complexes. 2,2

## UNIT—III

5. (a) What are metal olefin complexes? Discuss method of preparation and bonding in these complexes by taking example of zeise salt.
- (b) What are metal carbonyls? Give any two preparations of it. Draw the structure of  $\text{Fe}_2(\text{CO})_9$ . 2,2
6. (a) Complete the following reactions :
- (i)  $\text{Mo}(\text{CO})_6 + \text{NaBH}_4 \rightarrow$
- (ii)  $\text{R}_3\text{Al} + \text{SnCl}_4 \rightarrow$
- (iii)  $\text{K}_2\text{PtCl}_4 + \text{C}_2\text{H}_2 \rightarrow$
- (iv)  $\text{CO}_2(\text{CO})_8 + \text{PhC} \equiv \text{CPh} \rightarrow$
- (b) What do you understand by  $\beta$ -elimination in metal alloys? How can it be avoided? 2,2

#### UNIT—IV

7. (a) Discuss the Hb-O<sub>2</sub> and Mb-O<sub>2</sub> binding curves with diagram at different partial pressure of O<sub>2</sub> and how it is different from that of Mb-O<sub>2</sub> curve?
- (b) Explain the role of Na<sup>+</sup> – K<sup>+</sup> pump in biological system with mechanism. 2,2
8. (a) What is Bohr Effect? Discuss the cause and consequences of Bohr Effect.
- (b) Write a note on biological N<sub>2</sub>-fixations. 2,2

#### UNIT—V

9. (a) Calculate the CFSE value for [Co(CN)<sub>6</sub>]<sup>3-</sup> and [Co(NH<sub>3</sub>)<sub>6</sub>]<sup>3+</sup>.
- (b) What is Kurnakov test for the complexes of type [PtA<sub>2</sub>X<sub>2</sub>]?
- (c) What is EAN for the following compounds :
- (i) [Pt(NH<sub>3</sub>)<sub>5</sub>Cl]<sup>3+</sup>
- (ii) [V(CO)<sub>6</sub>]<sup>-</sup>
- (d) What are metalloporphyrins? Draw the Structure of heme.
- (e) Give the physiological role of Zn<sup>2+</sup> in biological systems.
- (f) Draw the structure of (σ-C<sub>5</sub>H<sub>5</sub>)<sub>2</sub> Ti(π-C<sub>5</sub>H<sub>5</sub>)<sub>2</sub> and give its IUPAC name. 6×1