



**NAVRACHANA
UNIVERSITY**
a UGC recognized University

School: School of Science
Program: B.Sc. in Chemistry
Year: 1st **Semester:** I
Examination: End Sem Examination
Examination year: December - 2022

Course Code: CH104 **Course Name:** Inorganic Chemistry-I

Date: 08/12/2022

Time: 08:30 am to 10:30 am

Total Marks: 40

Total Pages: 2

Instructions:

- All Sections are compulsory.
- Please read the questions carefully and answer accordingly.
- Draw a neat and labeled diagram wherever necessary.

Bloom's Taxonomy Levels

1. Remember 2. Understand 3. Application 4. Analysis 5. Evaluation 6. Creation

| | | Marks | COs* | BTL# |
|-------------|---|-----------|---------------------------------|--------------------------|
| Q.1. | Answer in details. (Any Four, each carry 05 marks) i. Define the shape of ClF_3 and ICl_2^- as per the VESPER theory. ii. Explain the hydrogen bonding in details (a) Hydrochloric acid and Dimethyl ether (b) O-nitrophenol. iii. Determine the configuration (in the form t_{2g} , eg as appropriate), the number of unpaired electrons, and the crystal field stabilization energy as a multiple of Δ_0 or Δ_T for each of the following complexes to decide, where relevant, which are likely to be strong-field and which are weak-field complexes: (a) $[\text{Co}(\text{NH}_3)_6]^{3+}$; (b) $[\text{Ni}(\text{CO})_4]$. iv. On basis of VBT, find out the type of hybridisation, magnetic moment, spin multiplicity and geometry of $[\text{Ni}(\text{DMG})_2]^-$. v. Write in detail about titration of strong acid against a strong base also explain the <i>pH</i> titration curves of different acids with sodium hydroxide. vi. Write in detail about theory of Acid-Base Indicators in detail. | 20 | CO1 CO2 CO3 CO4 CO5 | BT1 BT2 BT3 BT5 |
| Q.2. | Answer in brief. (Any Five, each carry 02 marks) i. Explain the shape of BeH_2 . ii. Write about limitations of VBT. iii. What mean by Common ion effect explain it with suitable example. iv. Derive the relation between hydrolysis constant and degree of | 10 | | |

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|-------------|--|-----------|--|--|
| | hydrolysis. v. Draw the crystal field energy diagram of $[\text{Cu}(\text{Cl})_6]^{4-}$. vi. Discuss the factors that contribute to the preference for forming either a high or a low-spin d^4 complex. | | | |
| Q.3. | Answer in short i. What is shape of AsCl_5 ? ii. What will be the coordination number of NaCl ? iii. How many coordinating sites are there in EDTA? iv. Give definition of acid-base on the basis of Arrhenius Concept. v. What will be the solution pH if we do the anionic hydrolysis. | 05 | | BT1 BT2 BT3 BT5 BT4 |
| Q.4 | Answer the following multiple choice questions i. An acid base titration involves a, (a) Composition reaction (b) Neutralization reaction (c) Decomposition reaction (d) Non of these. ii. What will be the pH of solution having concentration of H^+ ions 10^{-4} M. (a) 4 (b) 5 (c) 10 (d) Non of these iii. In case of Octahedral Complexes what will be the ground state orbital, (a) e_g orbitals (b) t_{2g} orbitals (c) e_g and t_{2g} orbitals (d) Non of these iv. In case of $[\text{Co}(\text{H}_2\text{O})_6]^{2+}$ what will be the hybridization. (a) sp (b) sp^2 (c) sp^3d^2 (d) Non of these v. $[\text{K}(\sigma_{2s_b})^2(\sigma_{2s_b}^*)^2(\pi_{z_b})^2(\pi_{x_b}=\pi_{y_b})^4(\pi_{x_b}^*=(\pi_{y_b}^*))^2(\pi_{z_b}^*)]$ is the electronic configuration of which molecule. (a) O_2 (b) F_2 (c) N_2 (d) Non of these | 05 | | |

-----End of Question Paper-----