



**A Charutar Vidya Mandal's Institution
V.P. & R.P.T.P. SCIENCE COLLEGE**

(AUTONOMOUS) (Grant-in-Aid)
Affiliated to Sardar Patel University
Vallabh Vidyanagar-388120

Bachelor of Science (Semester-III) External Examination - 2025
Subject Code: US03MACHE01 Subject Name: Inorganic Chemistry- I

Date: 06-10-2025, (Monday)

Time: 02:00 PM to 04:30 PM (2.5 hrs.)

Total marks: 50

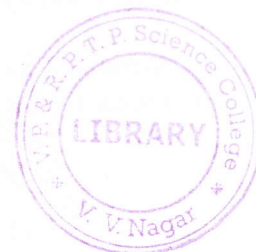


NOTE: (i) All Questions are to be attempted
(ii) Figures to the right indicate full Marks

Q-1 Write the most appropriate answer from the following multiple-choice questions.

[10]

- (1) According to Pearson's concept, hard acids prefer to bind with:
(A) Soft bases (B) Hard bases
(C) Borderline bases (D) Amphoteric bases
- (2) In HSAB theory, borderline interactions are:
(A) Always unstable (B) Sometimes unpredictable
(C) Most stable (D) Always ionic
- (3) Which of the following is a correct statement about non-aqueous solvents?
(A) They may act as acids or bases (B) They always contain water
(C) They never ionize (D) They are used only for precipitation reactions
- (4) In VBT, the central metal uses vacant orbitals to:
(A) Accept electron pairs (B) Donate electrons
(C) Form ionic bonds (D) Break existing bonds
- (5) Which complex is square planar?
(A) $[\text{Ni}(\text{CN})_4]^{2-}$ (B) $[\text{NiCl}_4]^{2-}$
(C) $[\text{Cu}(\text{NH}_3)_4]^{2+}$ (D) $[\text{Fe}(\text{CN})_6]^{4-}$
- (6) Bayer's process yields:
(A) Hydrated aluminium chloride (B) Pure alumina
(C) Aluminium hydroxide (D) Anhydrous aluminium nitrate
- (7) The steady decrease in atomic and ionic radii is called _____.
(A) Alkali contraction (B) Actinide contraction
(C) Earth contraction (D) Lanthanide contraction
- (8) Actinides have _____ magnetic moment than the lanthanides.
(A) more (B) less (C) same (D) none of these
- (9) In the metal carbonyls, _____ dative π -bonds bond form between metal and carbonyl.
(A) $\text{M} \rightarrow \text{CO}$ (B) $\text{M} \rightarrow \text{OC}$ (C) $\text{M} \leftarrow \text{CO}$ (D) $\text{M} \leftarrow \text{OC}$
- (10) Sodium nitroprusside with sulphide give _____ colour.
(A) red rose (B) Violet (C) green (D) blue



[P.T.O.]

-:Long answer questions:-

- Q-2** (a) What are Hard and soft bases? Explain HSAB Principle with suitable examples. 05
(b) Discuss ammonolysis and ammonation reaction takes place in liq. NH_3 Solvent. 05

OR

- Q-2** (a) Explain the application of HSAB principle in predicting the feasibility of a reaction and stability of complexes with suitable example. 05
(b) Discuss Metathetical reaction and complex formation reaction takes place in liq. SO_2 solvent. 05

- Q-3** (a) Discuss the shape, hybridization and magnetic property of Ferrocyanide ion $[\text{Fe}(\text{CN})_6]^{4-}$. 05
(b) Discuss the Occurrence of silicon and discuss the structure of silica. 05

OR

- Q-3** (a) Discuss Assumptions of valence bond theory. 05
(b) Give the occurrence of Aluminum and write note on Electrolysis of fused alumina. 05

- Q-4** (a) Define lanthanides. Give the name, symbol, atomic number and electronic configuration of lanthanides. 05

- (b) Discuss the magnetic properties of actinides. 05

OR

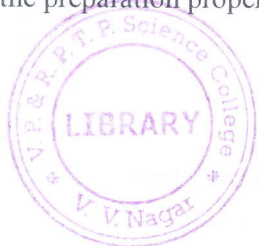
- Q-4** (a) Discuss the extraction of Lanthanides from monazite minerals by concentrate H_2SO_4 method. 05

- (b) Define actinides. Give the name, symbol, atomic number and electronic configuration of actinides. 05

- Q-5** (a) Discuss the preparation, properties, structure and hybridization in $\text{Ni}(\text{CO})_4$. 05
(b) Write a note on sodium nitroprusside. 05

OR

- Q-5** (a) Discuss the preparation, properties, structure and hybridization in $\text{Mn}_2(\text{CO})_{10}$. 05
(b) Discuss the preparation properties and structure of $[\text{Cr}(\text{CO})_6]$. 05



-:All the Best:-