



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 VI) Internal Examination - 2026
US06MACHE01: Inorganic Chemistry

Date: 6th March 2026, Friday
Time: 10:45 PM to 12:15 PM

Total marks: 30

Q:1 Answer the following multiple-choice questions.

[06]

- How many numbers of σ_v plane present in PCl_5 molecule?
(a) One (b) Two (c) Three (d) Four
- According to crystal field theory metal-ligand bonding are purely _____.
(a) ionic (b) metallic (c) covalent (d) none of these
- Crystal field stabilization energy depends on _____.
(a) ligand type (b) oxidation state (c) geometry (d) all of these
- The potential energy inside the box is _____.
(a) Infinite (b) zero (c) negative (d) none of these
- Eigen value of Hermitian operators are _____.
(a) complex (b) imaginary (c) real (d) zero
- In L-S coupling, what is the range of J for L= 2 and s = 1?
(a) 1,2,3 (b) 0,1,2 (c) 3,2,1 (d) 4,3,2



Q:2 Construct the multiplication table for C_{2h} point group and prove that it is an abelian point group.

[06]

OR

Q:2 Give the shape and point group of the following molecules:

[06]

- (i) BCl_3 (ii) NF_3 (iii) H_2O (iv) CH_4 (v) SF_6 (vi) Allene

Q:3 Discuss the splitting of d-orbital in octahedral complexes.

[06]

OR

Q:3 Define the trans effect and explain how it influences ligand substitution reactions in square-planar transition metal complexes?

[06]

Q:4 Derive the Schrödinger's wave equation for $y = f(x) \cdot \phi(t)$.

[06]

OR

Q:4 What are operators in quantum mechanics? Explain the second postulate of quantum mechanics.

[06]

Q:5 Draw the pigeon hole diagram and derive the term symbol for p^2 electronic configuration.

[06]

OR

Q:5 Draw and discuss the Orgel diagram for d^1-d^9 electronics configuration.

[06]

XXXXX

Roll No. : _____

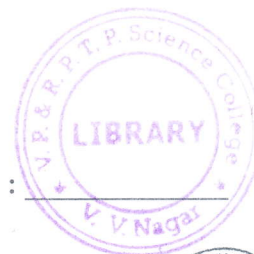
Supervisor's sign. : _____



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Bachelor of Science (Semester VI) Internal Examination - 2026
US06MACHE01: Inorganic Chemistry (Quiz)



Date: 06/03/2026

Day : Friday

Time: 20 Minutes

Total marks:15

Q: 1 Fill in the blanks with correct option.

[08]

1. _____ is the point group which contains no symmetry elements except E element. (C_i / C_1)
2. There are _____ σ_v plane present in ammonia molecule. (Three / Four)
3. _____ ligand produces the largest crystal field splitting. (CN^-/Cl^-)
4. _____ is the value of CFSE for d^5 electrons in high-spin complex. ($-0.8\Delta_o$ / Zero)
5. The value of lowest energy level in a 1-D box is _____. (E_0 / E_1)
6. _____ function is represented by Hamiltonian operator. (Velocity / Total energy)
7. According to Laporte's rule, _____ transition is allowed. ($p \rightarrow s$ / $s \rightarrow d$)
8. The wave function Ψ must be _____. (Continuous / Discontinuous)

Q: 2 Mention the following statements are true [$\sqrt{\quad}$] or false [X]:

[07]

1. There are two σ_d plane present in Allene molecule. []
2. There are two unpaired electrons present in $[Fe(CN)_6]^{4-}$ []
3. Crystal field theory does not explain magnetic property. []
4. A wave function cannot have discontinuity. []
5. Eigen values of Hermitian operators are real. []
6. The value of L for a d orbital is 2. []
7. The number of micro states for d^2 electron configuration is 15. []

XXXXXXX