This question paper contains 4+1 printed pages]

5231

M.Sc. (I Semester) Examination,

Dec. 2021

CHEMISTRY

Paper – 1.1

(CHEM. 511)

(Inorganic Chemistry)

Time Allowed : Three Hours

Maximum Marks : 70

Minimum Pass Marks : 28

This question paper will be divided into ***three*** *sections as under :*

Section-A ***Max. Marks-10***

Will carry ***10*** *marks with* ***01*** *compulsory question comprising* ***10*** *short answer type questions (maximum* ***20*** *words answer) taking two questions from each unit. Each question shall be of one mark.*

Section-B ***Max. Marks-1***

Will carry ***25*** *marks with equally divided in* ***five*** *long answer type questions (answer about in* ***25*** *words). Students are instructed to attempt* ***five*** *questio by selecting* ***one*** *question from each unit.*

Section-C ***Max. Marks-3***

Will carry ***35*** *marks with five long answer typ questions comprising one compulsory question (questio No.* ***7)*** *of* ***15*** *marks and four questions of* ***10*** *mark each. Students are instructed to attempt total* ***thre*** *questions with* ***one*** *compulsory question (answer abou in* ***500*** *words) and any* ***two*** *more questions (answe about in* ***400*** *words) out of remaining four question*

Section A

1. (*i*) What is APHICOPHILICITY ?

   (*ii*) Why there is difference in bond length o SiO_4^{4-} in estimated (1.76Å) and observe (1.63Å) values ?

(iii) Crystal field theory was proposed by

(iv) Give definition of John-Teller effect (theorem).

(v) Why is $[Cs(H_2O)_8]^+$ kinetically labile ?

(vi) What is the effect of size of central metal/ion on the stablity of complexes ?

(vii) Give the point group of Benzene of BF_3.

(viii) What does the Order of Point group mean ?

(ix) What does irreducible representation A_1g represents in term of symmetry elements ?

(x) Name *two* molecules of C_2V point group.

Section B

UNIT-I

2. Explain VSEPR theory and give its limitations.

Or

Briefly describe BENT RULE and Energetics of Hybridisation.

UNIT-II

3. Give limitations of crystal field theory.

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Or

Explain bonding in octahedral complexes with the help of Molecular Orbital Theory.

UNIT-III

4. Explain stepwise and overall formation constants and their relation.

Or

What is chelate effect ? Explain its thermodynamic origin.

UNIT-IV

5. How does similarity transformation help in class formation in a character table ? Explain it with an example.

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Or

Explain the following :

(i) Symmetry Elements and Symmetry Operations

(ii) Groups and sub-groups

(iii) Classes and order of a Point group. (1+2+2)

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6. Give irreducible representation of vibration for water molecule.

Or

Give irreducible representation of vibration for Ammonia molecule.

Section C

7. Explain the formation of Hybrid Orbitals in $[PtCl_4]^{2-}$ or H_2O molecule using group theory concepts. 15

8. Explain Walsh diagram for triatomic molecule.

9. Explain η^3 and η^5 systems with reference to molecular orbital theory.

10. Write short note on spectrophotometric determination of binary formation constants.

11. Explain great orthogonality theorem and its significance.

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