

542011
M.Sc. SECOND SEMESTER EXAMINATION
APRIL – MAY, 2015
SUBJECT: CHEMISTRY
PAPER – I
INORGANIC CHEMISTRY

Time: 3hrs

Max. Marks: 35

Min. Marks: 12

Note: All sections are compulsory. Marks are indicated against each section.

SECTION – A
Objective Type Questions

Q.1 Choose the correct answer: (1 x 5 = 5)

- (i) In comparison to $[\text{Fe}(\text{CN})_6]^{-4}$, the stability constant of $[\text{Fe}(\text{CN})_6]^{-3}$ is:
(a) lower (b) higher (c) equal (d) None of these
- (ii) The mechanism of substitution in square planar complexes is-
(a) SN^1 (b) SN^2 (c) SN^1CB (d) SE^1
- (iii) Non - bonding orbital in octahedral complexes is :
(a) A_{1g} (b) eg (c) t_{2g} (d) t_{14}
- (iv) The oxidation state of Ni-atom in $[\text{Ni}(\text{CO})_4]$ complex is.....
- (v) Which symmetry element is present in all molecules:
(a) C (b) J (c) O (d) E

SECTION – B
Short Answer Type Questions

(2 x 5 = 10)

Q.2. Discuss the chelate effect?

OR

P.T.O.

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Describe step – wise formation constant and overall formation constant of a metal complex?

- Q.3. Differentiate SN^1 and SN^2 mechanism of substitution reaction in transition metal complexes .

OR

Write a note on trans – effect.

- Q.4. Write a note on Spin Selection rule.

OR

Discuss charge transfer spectra.

- Q.5. Write a note on molecular Nitrogen complexes.

OR

Write a note on Vaska's compound.

- Q.6. Differentiate symmetry operation and symmetry element?

OR

Describe symmetry operations in water molecule?

SECTION – C
Long Answer Type Questions

(4 x 5 = 20)

- Q.7. What are the factors affecting stability of a metal complex considering nature of metal ion.

OR

Explain how experimentally, stability constant and composition of a complex is determined by spectroscopic method.

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- Q.8. What do you understand by base – hydrolysis? Discuss conjugate base mechanism.

OR

Discuss Polarization and Π Bonding Theories.

- Q.9. Discuss the formation of tetrahedral and square planar complexes. According to molecular orbital theory.

OR

What do you understand by Orgel diagram. Discuss Orgel diagrams for interpretation of electronic spectra of transition metal complex having d^2 and d^3 configuration.

- Q.10. Mention the various co-ordination modes of dinitrogen as ligand. Explain the nature of bonding in dinitrogen complexes.

OR

What are nitrosyl compounds? Discuss their methods of preparation. Highlight the important reactions of metal nitrosyls of environmental relevance.

- Q.11. Work out the matrix representations for various operation in C_{3v} point group along with their character.

OR

Work out point symmetries of the following molecules:

(i) C_6H_6 (ii) ClF_3 (iii) PCl_5 (iv) CO_2
