

Register Number
Name of the Candidate:

M.Sc. DEGREE EXAMINATION, May 2015**(CHEMISTRY)****(FIRST YEAR)****120: INORGANIC CHEMISTRY-I**

Time: Three hours

Maximum: 125 marks

SECTION-A**(5×3=15)****Answer ALL questions**

1. Define Lattice energy and write the born equation for calculating lattice energy.
2. $[AgI_2]^-$ is stable but not $[AgF_2]^-$ Why?
3. Write the theory of nuclear fission.
4. How will you prepare carbonyl hydrides?
5. Explain the structure of a porphyrin molecule.

SECTION-B**(5×10=50)****Answer ALL questions**

6. a) i) Explain the structure of Wurtzite.
ii) Explain the meaning of radius ratio rule with its application to predict the co-ordination number of cesium chloride.
iii) Write short notes on electroneutrality principle. (3+4+3)
(OR)
- b) i) What are electron deficient molecules?
ii) How is tetraborane prepared? Explain its structure and bonding. (3+7)
7. a) i) Draw and explain the crystal field splitting energy level diagram and stability of the complex. $[Co(CN)_6]^{3-}$
ii) Explain the spectrophotometric method of determining the stability constant. (6+4)
(OR)
- b) i) Account for the purple colour of $[Ti(H_2O)_6]^{3+}$ based on CFT.
ii) Draw and explain the crystal field splitting of d-orbitals in a square planar complex. (5+5)
8. a) i) Explain the different modes of radioactive decay with suitable example.
ii) Explain the causes and significance of Lanthanide contraction. (5+5)

(OR)

b) Briefly explain how Np, Pu and Am are separated from Uranium fission products.

9. a) i) Explain C-H activation reaction.
 ii) Explain the mechanism of polymerization using Z-N catalyst. (5+5)

(OR)

- b) i) Explain the mechanism of hydroformylation reaction catalysed by cobalt complex.
 ii) Why Vanadium hexacarbonyl is paramagnetic? (7+3)

10. a) Explain the dioxygen binding and transport properties of haemoglobin and myoglobin.

(OR)

b) Discuss the mechanism of photo substitution, photo oxidation and photo reduction reactions.

SECTION-C**(3×20=60)****Answer any THREE questions**

11. a) What is electro negativity? Explain the electro negativity scales and group electro negativity
 b) Write a note on any three types of binding forces operating in molecules. (10+10)
12. a) Define Jahn-Teller effect. Draw and explain the orbital energy level diagram of a d^9 ion in an octahedral complex caused by Jahn-teller effect.
 b) Discuss the concept of stabilisation of unusual oxidation states.
 c) Give an account of nomenclature of Co-ordination complexes. (10+5+5)
13. a) Write a detailed account on the applications of radio-isotopes in medicine
 b) Explain the principle and working of ionisation counter.
 c) Explain the spectral and magnetic properties of lanthanides.
 d) Discuss about the atomic power stations functioning in India. (5+5+5+5)
14. a) Explain the preparation, structure and bonding of Ferrocene.
 b) Discuss the structure of $[\text{Fe}(\text{CO})_9]$ and $[\text{Fe}(\text{CO})_{12}]$ (12+8)
15. a) Describe sodium/potassium pump.
 b) Explain the structure and functions of cytochrome-C
 c) Write in detail about the photochemical properties of Ru - (5+5+10)
 bipyridyl complex.
