

Roll No.

76051

**M.Sc. 3rd Semester Chemistry
Examination-December, 2015**

INORGANIC SPECIAL-I

Paper : CH-501 P-XI

Time : 3 hours Max. Marks : 80

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard will be entertained after the examination.

Note : Attempt five questions in all, selecting one question from each Unit. Q. No. 1 is compulsory. All questions carry equal marks.

1. (a) Distinguish two structures of AB_4 type molecule by normal modes of vibration. 2
(b) Give the selection rule for the vibrational Raman spectrum of a homonuclear diatomic molecule. 2

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determining the structure of inorganic compounds. 10

7. (a) What are finger print applications and how the mass spectrum is interpreted ? 12
(b) How the molecular weight of a substance is determined by Mass Spectrometry ? 4

UNIT - IV

8. (a) Explain why Atomic Absorption spectroscopy has become a powerful tool for quantitative analysis ? Give principle advantages and limitations of the method. 8

(b) Explain briefly the various types of interferences in AAS. 8

9. (a) Describe the principle and application of TGA. Why the applications of TGA are more limited than DTA. 10

(b) Write note on hollow cathode lamp and advantages of AAS over emission spectroscopy. 6

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- (c) Which orbital has unpaired electron in the EPR spectrum of tetragonal Cu(II) complex, where $g_{\parallel} > g_{\perp} > g_e$ and why? 2
- (d) How many number of Kramer's doublets results by zero-field splitting in a tetragonally distorted Cr(III) complex? Explain. 2
- (e) Which of the following nuclei ^{129}I , ^{57}Co , ^{57}Fe and ^{121}Sb will act as Mossbauer nuclei. 2
- (f) How many EPR peaks will be observed in the spectra of V^{3+} ion? ($I = 7/2$) 2
- (g) What are the basic requirements for a successful mass spectrometric analysis? 2
- (h) Discuss the principle of differential thermal analysis. 2

UNIT - I

2. (a) Discuss the normal modes of vibrations in Planar and Pyramidal AB_3 type molecules. 8
- (b) Explain the modes of bonding in Ambidentate ligands with one example. 8

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3. (a) What is Fermi Resonance? Explain this phenomenon by the vibrational spectra of linear CO_2 molecule. 6

- (b) How the Resonance Raman Spectroscopy is used to study the active sites of metallo-proteins? 10

UNIT - II

4. (a) Explain hyperfine-splitting in ESR spectra of CD_3 and n-propyl radical. 12
- (b) Discuss the ESR spectra of ML_4 transition metal complexes where M has $I = 3/2$ and L has $I = 1/2$. 4

5. (a) Give principle and presentation of EPR spectrum. 6

(b) Write notes on the following :

- (i) Hyperfine Coupling Constant 5
- (ii) Zero field splitting 5

UNIT - III

6. (a) Give a brief account of interactions which can affect the energy of γ -ray absorption by the sample. 6
- (b) With the help of a suitable example, explain how MB spectra is useful in 6

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