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Reg. No. : .....

Name : .....  
*22/02/2015*

First Semester M.Sc. Degree Examination, February 2015

Branch : Chemistry

CH 211 : INORGANIC CHEMISTRY – I

(2013 Admission Onwards)

(Common for CH/CL/CA/CM 211)

Time : 3 Hours

Max. Marks : 75

SECTION – A

Answer **two** among (a), (b) and (c) from **each** question and **each** question carries **2** marks.

- Iodine is almost insoluble in water, but it dissolves readily in an aqueous solution of KI. Why ? Explain.
  - Give the preparation and structure of any one oxofluoride of xenon.
  - What are zeolite ? Explain their use as water softeners.
- Which isomer is optically active, Cis or trans  $[\text{Co}(\text{en})_2\text{Cl}_2]^+$  ? Justify your answer.
  - Which ligand makes higher  $\Delta_0$  value;  $\text{H}_2\text{O}$  or  $\text{OH}^-$  ? Justify your answer.
  - State and illustrate Jahn Teller effect.
- What do you mean by significant figure ? How many significant figures are in the following ?
    - 0.0026 g
    - $6.023 \times 10^{23}$ .
  - What do you mean by correlation coefficient ? How can you calculate it ?
  - Give one example each for fluorescent, chemiluminescent, metallochromic and redox indicators.
- What are two dimensional nanoparticles ? Give examples.
  - What are carbon nanotubes ? How are they classified based on their structure ?
  - Explain how optical properties of quantum dots are related to quantum confinement effect.



5. a) Brief the role of catalytic converters in automobiles.  
b) How does chlorine free radicals act as ozone depleting agents ?  
c) Mention the different regions of atmosphere.

(2×10=20 Marks)

SECTION – B

Answer either (a) or (b) of **each** question and **each** question carries 5 marks.

6. a) Give an account of pseudohalogen compounds.  
b) What are Carbides ? Quoting suitable examples give their classification and structure.
7. a) If a solution contain  $1.6 \times 10^{-4}$  % of Nickel ions in the form of  $\text{Ni}^{2+}$  when the concentration of free  $\text{NH}_3(\text{aq})$  is 0.5 M. What is the stability constant of the complex  $[\text{Ni}(\text{NH}_3)_4]^{2+}$  ? (Assume that  $[\text{Ni}(\text{NH}_3)_4]^{2+}$  as the only complex formed).  
b) With the help of MO diagram explain how does a Pi acceptor ligand influences the magnitude of the splitting parameter in a Pi bonded octahedral complex.
8. a) Give a brief note on ‘Scatter diagram’ and its significance.  
b) Discuss the role of organic reagents in gravimetry.
9. a) Describe the method of synthesis of nanoparticles of (i) gold and (ii) platinum.  
b) What are the four steps in particle formation during gas phase synthesis of nanoparticles ?
10. a) List out the major air pollutants. Outline how they affect human health ?  
b) Describe how can you quantify soil acidity.

(5×5=25 Marks)

SECTION – C

Answer **any three** questions. **Each** question carries **10** marks.

11. i) How are heteropoly acids prepared ? Discuss the structure of 12-phosphomolybdic acid.  
ii) Explain the classification and structure of silicates.



12. i) Give brief notes on :
- i) spectrochemical and
  - ii) nephelauxetic series.
- ii) Discuss the merits of MOT over CFT and sketch the MO diagram for  $[\text{Co}(\text{NH}_3)_6]^{2+}$  and predict its magnetic behavior.
13. i) What is coprecipitation ? List the different types of coprecipitation and explain how they can be minimized.
- ii) What are chelometric titrations ? Explain 'selective' and 'deselective' masking.
14. Outline the idea of characterization of nanomaterials using SEM, TEM and STM techniques.
15. What are Pourbaix diagrams ? Outline its role in explaining the chemistry of processes in lithosphere.

(10×3=30 Marks)