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Total Number of Pages: 02

**M.Sc.I**  
**FCYC401**

**4<sup>th</sup> Semester Regular Examination 2016-17**

**INORGANIC CHEMISTRY-III**

**BRANCH(S): M.Sc.I(AC), M.Sc.I(AC)**

**Time: 3 Hour**

**Max Marks: 70**

**Q Code:Z572**

**Question No.1 which is compulsory and any five from the rest**  
**The figures in the right hand margin indicate marks.**

- Q1 Answer the following questions:** (2 x 10)
- Name the following complexes  
(i)  $K_4[Fe(CN)_6]$  (ii)  $Li[AlH_4]$  (iii)  $[Ni(dmg)_2]^0$  (iv)  $[Pt(NH_3)_4]$   $[PtCl_4]$
  - Why do square planer complexes not show optical isomerism?
  - What is a flexidentateligand ? Give examples of complexes with flexidentate ligands.
  - What is effective atomic number rule? Explain with examples.
  - Name the elements of second transition series with their atomic numbers.
  - Name two elements of Lanthanide series which exhibit +4 oxidation states. What is their electronic configuration in +4 oxidation state?
  - Calculate the CFSE of a  $d^3$  system in  $KJ mol^{-1}$  if  $\Delta_0$  for the same is  $20,300 cm^{-1}$ .
  - What is known as crossover region in crystal field theory?
  - Which complex has larger value of  $\Delta_0$  and why?  
 $[Co(NH_3)_6]^{3+}$  (ii)  $[Rh((NH_3)_6)]^{3+}$
  - What is a  $\delta$  – bond? Which carbonyl compound has a  $\delta$  bond?
- Q2**
- Compare the properties of 4d and 5d series elements with 3d series elements with reference to oxidation states, geometry of complex, magnetic properties and coordination number. (8)
  - Explain why KCl is highly soluble in water but AgCl is only sparingly soluble in water? (2)
- Q3**
- Why lanthanides are called 'f' block elements? What is their position in the periodic table? (3)
  - Describe the separation of lanthanides from Monazite with the help of the flow chart. (7)
- Q4**
- What is Actinide contraction? Why it occurs? (2)
  - Predict the number of unpaired electrons in  $Ce^{4+}$ ,  $Yb^{2+}$ ,  $Eu^{2+}$  &  $Lu^{3+}$  (4)
  - Describe the similarities between latter Lanthanides and Actinides. (4)
- Q5**
- What are salient features of VBT? (4)
  - Discuss bonding in (i)  $[Fe(NH_3)_6]^{2+}$  with four unpaired electrons. (6)  
(ii)  $[Ni(CN)_4]^{2-}$  as diamagnetic.

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- Q6 a) What do you understand by the terms Crystal field Splitting energy and Crystal field Stabilization energy? (2)
- b) Describe the crystal field splitting in an octahedral complex. (4)
- c) Which of the following complexes has more  $\Delta_0$  value and why? Also find number of unpaired electrons in them. (4)
- (i)  $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$  (ii)  $[\text{Fe}(\text{CN})_6]^{3-}$  bput question papers visit <http://www.bputonline.com>
- Q7 a) Discuss the structure and bonding in  $[\text{Cr}(\text{CO})_6]^0$  (8)
- b) Ni can form  $\text{Ni}(\text{CO})_4$  but  $\text{Zn}^{2+}$  cannot form  $[\text{Zn}(\text{CO})_4]^{2+}$  although  $\text{Ni}^0$  and  $\text{Zn}^{2+}$  are iso-electronic. Explain (2)
- Q8 **Write notes on** (5x2)
- a) Structure and bonding of Zeise's salt
- b) Chelate effect.

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