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**Chemistry (Hons.) Paper-VI**

Answer five questions in which Q.No. 1 is compulsory

1. Explain the followings :
  - (a) Magnetic behaviour of  $\text{CoCl}_4^{2-}$  and  $\text{Co}(\text{NH}_3)_6^{2+}$  differ.
  - (b)  $\text{Fe}(\text{CN})_6^{3-}$  is paramagnetic but  $[\text{Fe}(\text{CN})_6]^{4-}$  is diamagnetic.
  - (c)  $\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$  is blue coloured.
  - (d)  $\text{CoCl}_6^{3-}$  and  $\text{CoF}_6^{3-}$  has different magnetic moment.
2. Write notes on any two of the following : LNMUonline.com
  - (a) Nuclear fission (b) Nuclear fusion (iii) Separation of isotopes.
3. Write down the chemistry of *Ti* or *Mo* with special reference to :
  - (a) Position in P.T. (b) Occurance (c) Extraction (d) Important oxidation states.
4. Discuss the formation of following species by VBT :
  - (a)  $\text{Ni}(\text{CO})_4$  (b)  $\text{Ni}(\text{CN})_4^{2-}$  (c)  $\text{Fe}(\text{CN})_6 \dots$  (d)  $\text{Cu}(\text{NH}_3)_4^{2+}$
5.
  - (a) Discuss the main features of CFT.
  - (b) Explain d-orbital splitting in sq. planar field.
6. Write short notes on any two of the following :
  - (a) HSAB principle
  - (b) Factors affecting crystal field splitting parameter.
  - (c) Determination of magnetic susceptibility by Gou'y's method.
7. Calculate CFSE for following species :
  - (a)  $\text{V}(\text{H}_2\text{O})_6^{3+}$  (b)  $\text{MnCl}_4^{2-}$  (c)  $\text{FeF}_6^{3-}$  (d)  $\text{Fe}(\text{CN})_6^{3-}$  (e)  $\text{CoCl}_6^{3-}$
8. Discuss the following : LNMUonline.com
  - (a) Selection rules of electronic transition.
  - (b) Dependence of magnetic behaviour on *S*, *L* and *J* values
  - (c) Orgel diagram for  $d^1$  and  $d^9$  states.
9. Discuss any two of the following facts of :
  - (a) VB model for Co-ordination Compounds
  - (b) Ferromagnetism and antiferromagnetism
  - (c) Colour of  $\text{CoCl}_4^{2-}$  (Intense blue) and  $\text{Co}(\text{H}_2\text{O})_6^{2+}$  faint pink.