

- c) Pure NiO (pale green) is a poor conductor of heat ; but upon heating on air it converted into a black substance which can conduct heat – explain the phenomena. 2
- d) What is band gap and how it can be calculated expermientially? 2+1
- e) Explain with an example, how a thermal decomposition reaction can be monitored for an inorganic solid ? 2

**INTER B. SC. EXAMINATION, 2017**

( 2nd Semester )

**CHEMISTRY (HONOURS)****PAPER - X****INORGANIC CHEMISTRY**

Time : Two hours

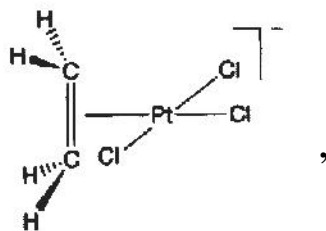
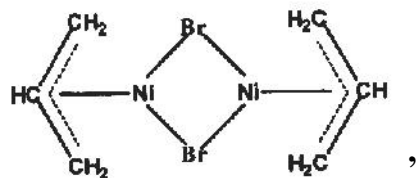
Full Marks : 50

Attempt *all* questions

1. a) Comment on the stability of penta-halides of group 15 elements. 2
- b) Write short notes on the followings :  
 (i) oxides of group 16 elements, (ii) catenation properties in group 16 elements, (iii) hydrides of group 15 elements and (iv) halides of group 16 elements. 3+2+2 $\frac{1}{2}$ +3
2. a) Depict the bonding (DCD model) of  $\pi$ -acid and  $\pi$ -base ligands pictorially using suitable exmaples with transition metals. 2
- b) Write down the IUPAC nomenclature of the following coordination compounds (any four) : 2  
 $[\text{Ru}(\text{NH}_3)_5(\text{N}_2)]^{2+}$ ,  $[\text{Fe}(\text{NH}_3)_6][\text{Cr}(\text{CN})_6]$ ,  
 $\text{Na}_2[\text{Fe}(\text{CO})_4]$ ,

[ Turn over

[ 2 ]



- c) Predict the structure of  $[\text{Co}(\text{CN})_5(\text{H}_2\text{O})]^{3-}$  using VB theory and comment on its redox behaviour. 3
- d) How do you differentiate *cis* and *trans* isomer of tetrachloridoplatinate (II) chemically?  $2\frac{1}{2}$
- e) i) Which of the following is the most likely to exist?  
 $[(\text{NH}_3)_5 \text{Co}-\text{CN}-\text{Co}(\text{CN})_5]$  or  
 $[(\text{NH}_3)_5\text{Co}-\text{NC}-\text{Co}(\text{CN})_5]$   
 Justify your answer.  $1\frac{1}{2}$

[ 3 ]

- ii) Draw an optically active square planar complex and justify.  $1\frac{1}{2}$
3. a) How many 3c2e bond present in  $\text{Al}(\text{BH}_4)_3$  and why? 1  
 b) Elucidate the structures of  $[\text{ClF}_2]^+$  and  $[\text{ClF}_2]^-$  1  
 c) What types of arrangement associated with the silicate part in mineral Beryl –  $\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}$ . 1  
 d) Write down the final product in the reaction of  $\text{BF}_3$  with water. 1  
 e) Comment on the structure of  $[\text{IF}_5]^-$  1  
 f) Write down a short note on digallane (Synthesis, structure and reactivity with ammonia and trimethyl amine). 3  
 g) How would you synthesize  $\text{KC}_8$ ? Discuss the colour and electrical properties of  $\text{KC}_8$ .  $1+1\frac{1}{2}$   
 h) Why  $\text{KBrO}_4$  is stronger oxidizing agent than  $\text{KClO}_4$  and  $\text{KIO}_4$  in acidic medium? 2
4. a) What do you mean by hexagonal close packing structure and how the tetrahedral holes and octahedral holes are generated in hexagonal close packing structure?  $2\frac{1}{2}$   
 b) What do you mean by electrical conductivity of metal? How can it be explained in terms of Fermi gas model of metallic bond?  $1+2$