P.G. 1st Semester-2017

CHEMISTRY

(Inorganic)

Paper : MCHECCT-102

Full Marks : 40 Time : 2 Hours

The figures in the right-hand margin indicate marks.

Candidates are required to give their answers in their own words as far as practicable.

Answer any **five** questions taking at least **two** from each Group:

GROUP–A

1. a) "H_2O is stronger field ligand than OH^-" – Explain the phenomenon.

   b) "The aqueous solution of $[Ti(OH_2)_6]^{3+}$ shows a maximum absorption around 20300 cm^{-1} in its electronic spectrum"– Express the band position in nm.

   c) "Color of Mn^{II} is very faint"– Why? 3+3+2=8

2. a) The electronic spectra of $[CoF_6]^{3-}$ is different from $[Co(en)_3]^{3+}$– Justify.

   b) Draw the structure of $[Nd(H_2O)_9]^{3+}$. Maintain its geometry.

   c) What is dynamic John Teller distortion? 3+(1+1)+3=8

3. a) Write down the molecular orbital wave function of the following AH_2 type molecule:

   i) When the band angle of HÂH is 90°.

   ii) When the band angle of HÂH is 90° and < 180°.

   iii) When the band angle of HÂH is 180°.

   Give pictorial presentations of the above molecular orbitals.

   b) Draw the Walsch diagram of planar AH_3 type molecule. 6+2=8

4. a) Obtain a solution of molecular orbital wave function of H_2^+ molecule with its energy expression using LCAO-MOT concept.

   b) What is nephelauxetic ratio (β)? Give an example. 6+2=8

GROUP–B

5. a) Find the "Styx" number of the molecule B_5H_9 and draw the structure of the molecule.

   b) Classify the following species by structural type:

   $Rh_6(CO)_{16}$, Sn_9^{4-}, $B_4H_7^-$ 4+1+(1+1+1)=8

6. a) Complete the reaction:

   i) $B_4H_{10} + NH_3 \rightarrow$

   ii) $B_2H_6 + R_2O \rightarrow$

   b) Write down the basic principle of PSEPT theory.

   c) Write short note on Zintle ion.

   (1+1)+3+3=8

7. a) Describe the active site structure of carboxy-peptidase with a diagram. Mention the role of it.

   b) What is the basic difference between catalase and peroxidase related to their structures and biological role.

   c) Draw the gross structure of Cu-Zn-SOD.

   3+4+1=8

8. a) Explain the photosynthetic electron transport chain with a diagram. Why this process is "Downhill flow of electrons"?

   b) Write a short note on O_2 transport mechanism.

   4+4=8

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