

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

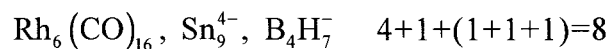
1. a) "H₂O is stronger field ligand than OH⁻"
– Explain the phenomenon.
- b) "The aqueous solution of [Ti(OH₂)₆]³⁺ shows a maximum absorption around 20300 cm⁻¹ in its electronic spectrum"– Express the band position in nm.
- c) "Color of Mn^{II} is very faint"– Why?
3+3+2=8

2. a) The electronic spectra of [CoF₆]³⁻ is different from [Co(en)₃]³⁺– Justify.
- b) Draw the structure of [Nd(H₂O)₉]³⁺. Maintain its geometry.
3+(1+1)+3=8
- c) What is dynamic John Teller distortion?
3. a) Write down the molecular orbital wave function of the following AH₂ type molecule:
 - i) When the bond angle of HÂH is 90°.
 - ii) When the bond angle of HÂH is 90° and < 180°.
 - iii) When the bond angle of HÂH is 180°.
 Give pictorial presentations of the above molecular orbitals.
- b) Draw the Walsh diagram of planar AH₃ type molecule.
6+2=8
4. a) Obtain a solution of molecular orbital wave function of H₂⁺ molecule with its energy expression using LCAO-MOT concept.
- b) What is nephelauxetic ratio (β)? Give an example.
6+2=8

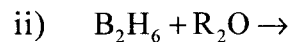
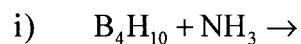
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GROUP-B

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:



6. a) Complete the reaction:



- b) Write down the basic principle of PSEPT theory.
- c) Write short note on Zintl ion.

$(1+1)+3+3=8$

7. a) Describe the active site structure of carboxypeptidase 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.

$4+4=8$