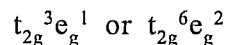


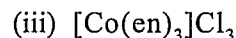
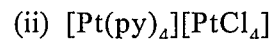
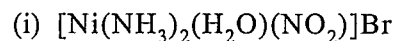
5. (a) Define Jahn-Teller theorem. Giving reason, explain in which case this effect would be observed :



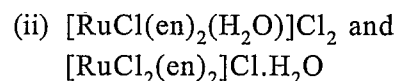
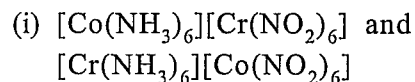
- (b) Explain why crystal field splitting energy for octahedral complex is larger than square planar complex.

- (c) $(\text{Co}(\text{NH}_3)_6)^{3+}$ is an inner orbital octahedral complex whereas $[\text{Ni}(\text{NH}_3)_6]^{2+}$ is an outer orbital complex. Explain. (5,5,5)

6. (a) Write the IUPAC names of following complexes :



- (b) Name the type of isomerism in the following pairs of isomers and discuss a method to distinguish them :



- (c) (i) The vanadium-carbon bond distance is longer in $\text{V}(\text{CO})_6$ than in $[\text{V}(\text{CO})_6]^-$. Give reason.

- (ii) What is meant by the term 'hapticity'. Explain with suitable examples. (5,5,5)

(1000)

[This question paper contains 4 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 7016

K

Unique Paper Code : 2172581101

Name of the Paper : DSC – INORGANIC CHEMISTRY

Name of the Course : **B.Sc. (Prog.) in Applied Life Science with Agrochemicals and Pest Management**

Semester : I

Duration : 2 Hours

Maximum Marks : 60

Instructions for Candidates

1. Write your Roll No. on the top immediately on receipt of this question paper.
2. All questions carry equal marks.
3. Attempt any **four** questions.

1. (a) The magnetic moment of $[\text{Fe}(\text{H}_2\text{O})_6]^{3+}$ is 5.92 B.M. and that of $[\text{Fe}(\text{CN})_6]^{3-}$ is 1.73 B.M. Explain on the basis of crystal field theory.

(b) Define the following terms :

(i) Ambidentate ligands

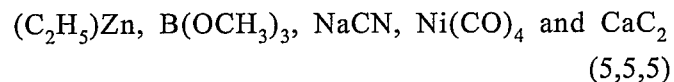
(ii) Crystal field stabilization energy (CFSE)

P.T.O.

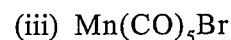
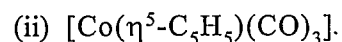
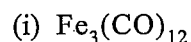
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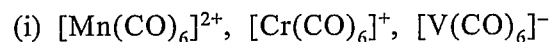
- (c) Which of the following is not considered as an organometallic compound and why?



2. (a) What is 18 electron rule? Using 18 electron rule as guide, predict which of the following compounds are stable



- (b) Arrange the following compounds in increasing order of IR stretching frequencies of C-O bond:



- (c) Draw MO diagram of CO and explain why CO acts as an electron pair donor and acceptor through C and not O. (5,5,5)

3. (a) What are organometallic compounds? Giving appropriate examples, explain how will you classify organometallic compounds based on nature of metal-carbon bond present in it?

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- (b) What is zeise's salt? Discuss the bonding in zeise's salt on the basis of Dewar- Chatt-Duncanson model and IR studies. How is M-C bonding in zeise's salt different from that in metal carbonyl complexes?

- (c) (i) Describe different factors which affects the magnitude of Δ_0 .

- (ii) Which of the following compounds have high CFSE and why? $[Cr(CN)_6]^{3-}$ or $[Cr(NH_3)_6]^{3+}$.
(5,5,5)

4. (a) (i) Using the valence bond method, assign hybridization, geometry and predict the magnetic moment (in Bohr magnetons) for $[Cr(en)_3]^{2+}$ complex.

- (ii) State two limitations of valence bond theory.

- (b) Explain :

- (i) Cu^{2+} ions are coloured and paramagnetic whereas Zn^{2+} ions are colourless and diamagnetic.

- (ii) All tetrahedral complexes are high spin.

- (c) Draw crystal field splitting diagram for $[CoCl_4]^{2-}$ and $[Fe(CN)_6]^{4-}$. Also calculate CFSE for both.
(5,5,5)

P.T.O.