

ISLAMIAH COLLEGE [AUTONOMOUS], VANIYAMBADI  
END SEMESTER EXAMINATIONS – MAY - 2020

Time: 3 Hrs

Max. Marks: 75

Subject: Inorganic Chemistry IV

Sub. Code: P8CH4001 / P6CH4001

**PART - A (5 X 6 = 30)**  
**Answer ALL the Questions**

1. (a) Predict the term symbol for (2+2+2)  
i)  $[\text{NiCl}_4]$       ii)  $[\text{Fe}(\text{H}_2\text{O})_6]$       iii)  $[\text{Ir}(\text{NH}_3)_6]_2$   
(Or)  
(b) State and explain the Koopmann's theorem.
2. (a) Find out the number of M-M bonds for the given compounds  
i)  $[\text{Fe}(\text{CO})_9]$       ii)  $[\text{Co}_4(\text{CO})_{12}]$       iii)  $[\text{Os}_4(\text{CO})_{14}]$   
(Or)  
(b) Explain the metal ligand stretching vibration for cyanides and carbonyls.
3. (a) Write the principle of NQR. Mention its applications.  
(Or)  
(b) How many NMR lines are seen in  $[\text{NH}_4]^+$ ,  $\text{CH}_4$ ,  $\text{NH}_3$  with splitting diagram?
4. (a) Specify the role of lanthanides and actinides in nuclear chemistry.  
(Or)  
(b) Bring out the methods of preparation for nanoparticles.
5. (a) Discuss the biological role of Haemoglobin.  
(Or)  
(b) What are metalloenzymes? Explain.

**PART - B (3 X 15 = 45)**  
**Answer any THREE Questions**

6. a) Find the energy transition for  
i)  $d^3$  and  $d^8$  high spin octahedral complexes  
ii)  $d^7$  tetrahedral complex  
b) Draw and explain the Morse potential energy diagram.  
c) Explain the principle of UVPES.
7. Elucidate the structure of  $\text{H}_2\text{O}$ ,  $\text{N}_2\text{O}$  and  $\text{ClF}_3$  molecules using IR and Raman spectra.
8. Account on the following:  
i) McConnell's equation  
ii) Karmer's theorem  
iii) Zeeman equation
9. i) Explain the oxidation states, spectral and magnetic properties of lanthanides with suitable examples.  
ii) Enlist the applications of nanoparticles in optoelectronics.
10. i) Draw and explain the nitrogen cycle.  
ii) Write a note on copper proteins.

**Due to COVID-19 Pandemic**  
**Sanitize Your Hands**  
**Wear Face Mask**  
**Follow Social Distancing Norms**