

FD-305

M.Sc. 1st Semester Examination, Dec.-Jan., 2021-22

CHEMISTRY

Paper - I

Group Theory and Chemistry of Metal Complexes

Time: Three Hours] [Maximum Marks: 80 [Minimum Pass Marks: 16]

Note: Answer **all** questions. The figures in the right-hand margin indicate marks.

Unit-I

- **1.** (a) Write the postulates of great orthogonality theorem.
 - (b) Write down the multiplication table for C_{2v} point group. 8
 - (c) Define proper and improper axes of symmetry with suitable example.

OR

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(Turn Over)

6

	(a)	Explain reducible and irreducible representation.	6
	(b)	Find out point group for the following compounds:	8
		(i) P-dichlorobenzene(ii) ClF₃(iii) NH₃	
	(c)	Write a note on conjugacy relation and classes.	6
		Unit-II	
2.	(a)	Explain the formation of σ bonds in any octahedral complex using MOT.	6
	(<i>b</i>)	Write chemical reactions of sodium nitropruside.	6
	(c)	Describe molecular configuration of CO molecule as suggested by Coulson.	8
		OR	
	(a)	Discuss the structure of mononuclear dioxygen complex.	6
	(<i>b</i>)	Fe (CO) ₅ is known while $[Fe (CO)_6]^{3+}$ is not known. Why?	6
	(c)	Write the effects of π bonding on the value of Δ_0 .	8

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(Continued)

Unit-III

3.	(a)	How does chelation affects stability of complexes?	6		
	(b)	Describe the experimental determination of stability constant by spectrophotometric method.	8		
	(c)	Explain the types of Isopolytungstate.	6		
		OR			
	(a)	Write a note on properties and uses of aluminosilicates.	6		
	(b)	Write a note on synthesis and properties of silicones fluids and silicones rubber.	8		
	(c)	Give classification of heteropoly molybdate.	6		
		Unit-IV			
4.	(a)	What are phosphazines? Discuss nature of bond in triphosphazines.	6		
	(b)	What are carboranes? Write their preparation properties and structure.	8		
	(c)	Write a note on Borazines.	6		
		OR			
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(4)

(a)	Write Wade's rule to explain the structure of closo, nido and arachno boranes.						
(b)	Write a note on heterocatenation.	6					
(c)	What are metal carbonyl culster? Describe with suitable examples.	8					

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