

MSc DEGREE EXAMINATION MAY 2026
(Second Semester)

Branch -**CHEMISTRY**

ORGANOMETALLIC CHEMISTRY

Time: Three Hours

Maximum: 75 Marks

SECTION-A (10 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 × 1 = 10)

Module No.	Question No.	Question	K Level	CO
1	1	Which rule is commonly used to predict the stability of metal alkyl complexes? (i) Aufbau rule (ii) Fajans rule (iii) 18-electron rule (iv) Hund's rule	K1	CO1
	2	Insertion of CO into a metal-alkyl bond forms _____. (i) alkane (ii) acyl complex (iii) alkene (iv) carbene	K2	CO1
2	3	The bonding model describing σ donation and π back donation in metal alkene complexes is _____. (i) Valence bond theory (ii) Crystal field theory (iii) Dewar-Chatt-Duncanson model (iv) Molecular Orbital Theory	K1	CO2
	4	Industrial oxidation of ethylene to acetaldehyde using $\text{PdCl}_2 / \text{CuCl}_2$ catalyst system is known as _____. (i) Heck reaction (ii) Wacker process (iii) Hydroformylation (iv) Metathesis	K2	CO2
3	5	A complex containing only one cyclopentadienyl ring attached to a metal is called _____. (i) Sandwich complex (ii) Half sandwich complex (iii) Multidecker complex (iv) Bent sandwich complex	K1	CO3
	6	Complexes containing two metal atoms sandwiched between three cyclopentadienyl rings are called _____. (i) Bent sandwich complexes (ii) Arene complexes (iii) Multidecker complexes (iv) Allyl complexes	K2	CO3
4	7	Stretching frequency of terminal CO in metal carbonyls generally appears in IR region around _____. (i) 1200-1415 cm^{-1} (ii) 1500-1625 cm^{-1} . (iii) 1850-2125 cm^{-1} (iv) 2200-2425 cm^{-1}	K1	CO4
	8	The borane $\text{B}_6\text{H}_6^{2-}$ is classified according to Wade's rule as _____. (i) Closo (ii) Nido (iii) Arachno (iv) Hypo	K2	CO4
5	9	Host-guest binding depends on geometric complementarity is ____ principle. (i) Chelate effect (ii) Macrocyclic effect (iii) Lock and key (iv) Inductive effect	K1	CO5
	10	Cyclic polyethers that selectively bind alkali metal cations are _____. (i) Podands (ii) Cryptands (iii) Corands (iv) Spherands	K2	CO5

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SECTION - B (35 Marks)

Answer ALL questions

ALL questions carry EQUAL Marks

(5 × 7 = 35)

Module No.	Question No.	Question	K Level	CO
1	11.a.	Classify organometallic compounds with the appropriate definition and suitable examples.	K1/K2	CO1
		(OR)		
	11.b.	Explain the stability and structural features of metal alkyl complexes.		
2	12.a.	Inference the synthesis of alkene complexes by (i) ligand substitution (ii) Reduction method	K3/K4	CO2
		(OR)		
	12.b.	Analyze the mechanism of Heck reaction and its synthetic applications.		
3	13.a.	Discuss the synthesis, structure and reactivity of allyl complexes.	K6	CO3
		(OR)		
	13.b.	Discuss the synthesis of metallocenes with suitable examples.		
4	14.a.	Examine the structure of polynuclear carbonyls and describe the method for calculating the number of M-M bonds in cluster carbonyls.	K5	CO4
		(OR)		
	14.b.	Explain the preparation, structure and bonding in nitrosyl complexes.		
5	15.a.	Explain the various types of non-covalent interactions involved in supramolecular chemistry with suitable examples.	K3	CO5
		(OR)		
	15.b.	Differentiate Thermodynamic selectivity and Kinetic selectivity with examples.		

SECTION - C (30 Marks)

Answer ANY THREE questions

ALL questions carry EQUAL Marks

(3 × 10 = 30)

Module No.	Question No.	Question	K Level	CO
1	16	Summarize the methods of synthesis, bonding, structure and properties of Carbene complexes.	K2	CO1
2	17	Explain the bonding in diene complexes. Compare σ , π and η^4 bonding modes with suitable examples.	K3	CO2
3	18	Describe seven and eight membered ring ligands in organometallic chemistry and explain their coordination behaviour with examples.	K6	CO3
4	19	Explain the concept of isolobal fragments and discuss its application in understanding the relationship between organometallic clusters and boranes.	K5	CO4
5	20	Describe the synthesis of dendrimer molecules and discuss their structural features and applications.	K3	CO5

Z-Z-Z END