



**RA-302001**

Seat No.

**M. Sc. (Sem. II) Examination**

**June / July - 2022**

**MSC1C201 : Inorganic Chemistry  
(New Course)**

**Time : 3 Hours]**

**[Total Marks : 70**

**Instructions :** (1) All questions are compulsory.  
(2) Figures to the right indicate total marks of the questions.

**1** Answer the following questions :

- (a) Explain the Bent's rule. Discuss its effects on the bond distance and Bond angles on the different Fluoromethanes. **7**

**OR**

- (a) Discuss Walsh diagram for  $XH_2$  type of the molecule. **7**  
(b) Explain Pariser-Parr-Pople approximation. **7**

**OR**

- (b) Write a short note on Band theory of Solids and Fermi levels. **7**

**2** Answer the following questions :

- (a) In a molecule ( $AB_5 : C_4V$ ) central atom A has s, p and d orbitals, what are the orbitals available on A which will form  $\sigma$ -bond with B ? **7**

**OR**

- (a) Write the different steps involved in working out the molecular orbitals in  $AB_3$  type of molecule. **7**

- (b) In a molecule  $[M(CO)_4L_2]$  ( $D_{4h}$ ) find out the symmetries of stretching vibration only for CO. 7  
Assign which will be IR active and which will be Raman active will then be any coincidence ?

**OR**

- (b) Following band were observe the vibrational spectrum of  $PD_3$  ( $C_{3v}$ ) 7

IR $cm^{-1}$	Raman $cm^{-1}$
1698	1678 (pol)
1694	1694 (d-pol)
808	808 (pol)
730	728 (d-pol)

Assign this band to their corresponding irreducible representation.

**3** Answer the following questions :

- (a) Define organometallic compound their classification and properties of OMC of Transition metals. 7

**OR**

- (a) Explain the role of organometallic compounds in catalytic reaction. 7  
(b) Write a note on 3 electron donor. 7

**OR**

- (b) Discuss the stability of metal-carbon bond in organometallic compounds. 7

**4** Answer the following questions :

- (a) Discuss the factors affecting the rate of reaction. 7

**OR**

(a) Describe the kinetics of substitution reaction of Pt (II) complexes of square planar complexes. 7

(b) State the Marcus-Hush theory. Derive Marcus equation. 7

OR

(b) Give the criteria to recognize outer sphere reaction and examples of such reaction. 7

5 Answer the following questions in short : (any 14) 14

(1) What is accidental degeneracy ?

(2) Define Mutual exclusion rule.

(3) What is the physical significance of  $H_{ii}$  in secular equation ?

(4) Define Hapticity.

(5) What is symmetry of transition which is polarized in Raman spectrum ?

(6) Why self-consistent field method is required ?

(7) Define hydrated electron.

(8) What is main difference between inner sphere and outer sphere reactions ?

(9) Define insulators.

(10) What is the oxidation state of Cr in dibenzene chromium ?

(11) OMC the name of catalyst used in polymerization reaction of alkenes.

(12) Give the formula for nuclear factor in Marcus equation.

(13) For a molecule with point group  $C_{2v}$ , write down a representation which is totally symmetric.

(14) Define VSIP.

(15) Give the name of process which produce hydrated electron.