



GI-142001

Seat No. _____

M. Sc. (Sem. II) Examination

March / April - 2019

MSC0C201 : Inorganic Chemistry

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) Based on the value of delocalization energy, find out the order of stability in cyclopropenyl system. **7**

OR

- (a) Discuss walsh diagram for XH_2 type of the molecule. **7**
 (b) Explain " self consistent field method". **7**

OR

- (b) Explain the Bent's rule. Discuss its effects on the bond distance and Bond angles on the different Fluoromethanes. **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 6-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) Following bands were observed in the vibrational spectrum of SO_2 . **7**

IR (cm^{-1}) vapour phase	Raman (cm^{-1}) liquid phase
518	524 (pol)
1151	1145 (pol)
1362	1336 (d-pol)

Assign these band to their corresponding irreducible representation.

OR

- (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 ?

- 3 Answer the following questions : 7
- (a) Define organometallic compound their classification and properties of OMC of Transition metals. 7
- OR
- (a) Explain the structure and bonding in η^4 -OMC considering butadiene. 7
- (b) Write a note on metal arene complexes. 7
- OR
- (b) Discuss the stability of metal-carbon bond in organometallic compounds. 7
- 4 Answer the following questions : 7
- (a) Discuss the factors affecting the rate of reaction. 7
- OR
- (a) Give the criteria to recognize outer sphere reaction and examples of such reaction. 7
- (b) Write a note on "Hydrated electron". 7
- OR
- (b) Explain "Tuning effect". 7
- 5 Answer the following questions in short : 14
- (i) Define insulators.
- (ii) Define charge Density.
- (iii) What is the physical significance of H_{ii} in secular equation?
- (iv) Give one example of a molecule of the type AX_5E_1 according to VSEPR theory.
- (v) What is the symmetry of transition which is polarized in Raman spectrum.
- (vi) How many active vibrations will be there in a non-linear molecule.
- (vii) Name the d-orbital used in σ -bonding in AB_6 (O_h type molecule).
- (viii) What will be the level of coincidence in a centrosymmetric molecule.
- (ix) Define Hapticity.
- (x) What is the oxidation state of Fe in ferrocene.
- (xi) Write the use of "Silicon oil".
- (xii) Write a structure of Zeise's salt?
- (xiii) Write the two factor of affecting the rate of reaction.
- (xiv) Give the formula for nuclear factor in Marcus equation.