



FC-142001

Seat No. _____

M. Sc. (Sem. II) Examination

June / July - 2021

**MSC0C201 : Inorganic Chemistry
(Old Course)**

Time : 2 Hours]

[Total Marks : 50

- Instructions :** (1) Answer only **three (3)** questions.
(2) The examination will be for **two (02)** hours.
(3) Q. No. **9** is **compulsory** and carries **14** marks.
(4) Answer any **two** questions from questions
No. 1 to 8. Each question carries **18** marks.

- 1 (a) Explain the Bent's rule on the different fluoromethanes.
(b) Explain VSEPR theory.
- 2 (a) Discuss Walsh diagram for XH_2 type of the molecule.
(b) Write a short note on Pariser-Parr-Pople approximation.
- 3 (a) Write the different steps involved in working out the molecular orbital in AB_3 type molecule.

- (b) Following bands were observed in the vibrational spectrum of PD_3 (C_{3v})

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

Assign these bands to their corresponding irreducible representation.

- 4 (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 σ -bonds with B?
- (b) Find out hybridization for π -bonding for AB_4 type molecule (D_{4h}).

- 5 (a) Write a note on metal arene complexes.
- (b) Discuss the stability of metal-carbon bond in organometallic compounds.
- 6 (a) Explain the structure and bonding in η^4 -OMC considering butadiene.
- (b) Explain π -bonding structure and bonding in ferrocene.
- 7 (a) Give the criteria to recognize outer sphere reaction and examples of such reaction.
- (b) Explain "Tuning effect".
- 8 (a) State the Marcus-Hush theory. Derive Marcus equation.
- (b) Write a note on "Hydrated electron".
- 9 Answer the following question in short
 - (i) Define charge Density.
 - (ii) Give one application of semiconductors.
 - (iii) What is the application of Huckel theory?
 - (iv) Why self-consistent field method is required?
 - (v) Name the d-orbital used in δ -bonding in $AB_5(D_{3h})$ type molecule.
 - (vi) What is symmetry of transition which is polarized in Raman spectrum?
 - (vii) Total number of active vibration in non linear molecule will be.....
 - (viii) Draw the structure of OMC of di benzene chromium.
 - (ix) What is the oxidation state of Fe in ferrocene?
 - (x) OMC the name of catalyst used in polymerization reaction of alkenes.
 - (xi) Write a structure of Zeie's salt?
 - (xii) What is main difference between inner sphere and outer sphere reactions ?
 - (xiii) Write the two factor of affecting the rate of reaction.
 - (xiv) Write the use of "Silicon oil".