

Seat No. \_\_\_\_\_

**MAY - 2017**  
**MSC0C201 (Sem - II)**

**Time : 3 Hrs.**

**Inorganic Chemistry**

**Total Marks : 70**

- Instruction : (1) All Questions are Compulsory.  
(2) Figures to the right indicate total marks of the Questions.

1. Answer the following questions.

(a) For benzene molecule, find out  $E_{\pi}$ ,  $\pi$ -bonding energy and delocalization energy.

7

OR

Explain VSEPR theory.

(b) Explain the Bent's rule on the different fluoromethanes.

7

OR

Discuss Walsh diagram for  $AH_2$  type of the molecule.

2. Answer the following questions.

(a) Determine the sets of specific atomic orbitals that can be combined to form hybrid orbitals for  $\sigma$ -bonding for  $AB_5$  ( $C_{4v}$ ).

7

OR

Find out hybridization for  $\pi$ -bonding for  $AB_4$  type molecule. ( $D_{4h}$ ).

(b) Assign the given IR and Raman spectra data to various stretching and bending in  $AB_3$  ( $D_{4h}$ ) molecule.

7

<u>IR <math>cm^{-1}</math></u>	<u>Raman <math>cm^{-1}</math></u>
1454	1453(depolarized)
-----	888(polarized)
692	-----
479	481 (depolarized)

OR

By using SALC, write the different steps involved in working out the molecular orbitals in  $AB_6$  type molecule.

3. Answer the following questions.

(a) Discuss in detail transition metal-butadiene compounds.

7

OR

Discuss the stability of M-C bond in organometallic compounds.

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(b) Explain the structure and bonding in acetylene organometallic compounds. 7

OR

Explain  $\pi$ -bonding structure and bonding in ferrocene.

4. Answer the following questions.

(a) State Marcus-Hush theory. Derive Marcus equation. 7

OR

Explain Tunneling effect.

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

OR

Discuss the substitution reaction mechanism of square planar complexes.

5. Answer the following questions in short. 14

- (1) Give one application of semiconductors.
- (2) Define VSIP.
- (3) What is the application of Huckel MO theory ?
- (4) Why self consistent field method is required ?
- (5) For a molecule with point group  $C_{2v}$ , write down a representation which is totally symmetric.
- (6) How would you distinguish between IR and Raman vibrations if a molecule possesses centre of symmetry ?
- (7) Name the d-orbital used in  $\sigma$ -bonding in  $AB_5$  ( $D_{3h}$ ) type of molecule.
- (8) How many active vibrations will be there in a linear molecule.
- (9) Write the formula of Zeise's salt.
- (10) Define Hapticity.
- (11) Complete the reaction :  $D-[Os(dipy)_3]^{2+} + L-[Os(dipy)_3]^{3+} \longrightarrow$  \_\_\_\_\_
- (12) What is the condition for outer sphere reaction ?
- (13) Define hydrated electrons.
- (14) Give example of inner – sphere reaction.