

**PARUL UNIVERSITY**  
**FACULTY OF APPLIED SCIENCE**  
**M.Sc. Winter 2018-19 Examination**

Semester: 1

Subject Code: 11205102

Subject Name: Inorganic Chemistry-I

Date: 03/12/2018

Time: 10:30 am to 1:00 pm

Total Marks: 60

**Instructions:**

1. All questions are compulsory.
2. Figures to the right indicate full marks.
3. Make suitable assumptions wherever necessary.
4. Start new question on new page.

- Q.1. A) Answer the following questions (4x2) (Each of 04 marks) (08)**
- a) Discuss crystal field splitting for tetrahedral complex.
  - b) What is diborane? Discuss it in detail.
- Q.1. B) Answer the following questions (Any two) (04)**
- (a) Do as directed: (Each of 02 marks)
    1. Draw crystal field splitting diagram for octahedral complex.
    2. Calculate term symbols for  $p^2$  configuration.
  - (b) Calculate CFSE values for  $d^1$  to  $d^{10}$  electronic configurations. (04)
  - (a) Explain tetragonal distortion in octahedral complex. (04)
- Q.2. A) Answer the following questions. (04)**
- (a) Do as directed:
    1. In STYX rules, what S, T, Y and X stand for?
    2. Define the term Isolobal analogy. Explain it with examples.
  - (b) Write a note on borazine. (04)
- Q.2. B) Answer the following questions (Any two) (03)**
- (a) Do as directed:
    1. Name of  $B_4H_{10}$  is \_\_\_\_\_
    2. A compound in which the boron or boron-carbon framework forms a regular polyhedron is known as \_\_\_\_\_ compounds.
      - (a) Closo (b) Nido
    3. Define the term carborane.
  - (b) Discuss synthesis, structure and bonding of  $Ni(CO)_4$ . (03)
  - (c) Which are the bonding possibilities in boranes? (03)
- Q.3. A) Essay type/ Brief note (4x2) (Each of 04 marks) (08)**
- (a) Discuss the possibilities of formation of helium molecule and lithium molecule with the help of molecular orbital diagrams.
  - (b) Discuss valence bond and molecular orbital interpretations of  $H_2^+$  and  $H_2$  molecules.
- Q.3. B) Answer the following questions (Any two) (04)**
- (a) Do as directed: (Each of 02 marks)
    1. What do you mean by metal carbonyl and metal nitrosyl?
    2. Discuss various types of orbital overlapping.
  - (b) What is the full form VBT? Discuss it in detail with examples. (04)
  - (c) Write a note on electron sea theory. (04)
- Q.4. A) Answer the following questions. (04)**
- (a) Do as directed: (Each of 02 marks)
    1. Draw molecular orbital diagram of CO molecule.
    2. Draw crystal field splitting diagram for square planar complex.
  - (b) Discuss bonding in metal nitrosyls. (04)
- Q.4. B) Answer the following questions (Any two) (03)**
- (a) Do as directed: (Each of 01 marks)
    1. Define bond energy.
    2. The shape of  $BF_3$  molecule is \_\_\_\_\_.
    3. What is the shape of  $XeF_4$  molecule?
 

(A) Tetrahedral	(B) Square planar
(C) Octahedral	(D) Linear
  - (b) Write a note on bond order. (03)
  - (c) Discuss the shapes of water and ammonia. (03)