

Total No. of Printed Pages—7

**3 SEM TDC CHMH (CBCS) C 5**

**2 0 2 1**

( Held in January/February, 2022 )

**CHEMISTRY**

( Core )

Paper : C-5

**( Inorganic Chemistry )**

Full Marks : 53

Pass Marks : 21

Time : 3 hours

*The figures in the margin indicate full marks  
for the questions*

1. Choose the correct answer : 1×6=6

(a) The metal oxide which cannot be reduced by carbon is

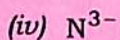
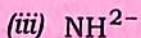
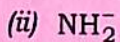
(i) ZnO

(ii) PbO

(iii) Fe<sub>2</sub>O<sub>3</sub>

(iv) Cr<sub>2</sub>O<sub>3</sub>

(b) The conjugate base of  $\text{NH}_3$  is



(c) Number of 3c—2e bonds present in diborane is

(i) 3

(ii) 1

(iii) 4

(iv) 2

(d) The type of hybridization in  $\text{NO}_2^-$  ion is

(i)  $sp$

(ii)  $sp^2$

(iii)  $sp^3$

(iv)  $dsp^3$

(e) The shape of  $\text{XeF}_4$  molecule is

(i) tetrahedral

(ii) square planner

(iii) T-shape

(iv) octahedral

(f) The formula of inorganic benzene is

(i)  $\text{B}_6\text{H}_6$

(ii)  $\text{B}_3\text{N}_3\text{H}_6$

(iii)  $\text{Al}_6\text{H}_6$

(iv)  $\text{B}_3\text{Al}_3\text{H}_6$

2. Write short notes on the following (any two) :

2×2=4

(a) Carbon reduction process

(b) Van-Arkel process

(c) Hydrometallurgy

3. Answer any *two* of the following questions :

3×2=6

(a) What are hard and soft acids and bases (HSAB)? Mention one application of HSAB principle.

2+1=3

(b) What are Lewis acids? Classify different types of Lewis acids with example.

1+2=3

(c) What are conjugate acid-base pair? Applying this concept, explain why water can act both as acid and base.

1+2=3

4. Answer any *five* of the following questions :

2×5=10

(a) What is inert-pair effect?

(b) Explain the term 'diagonal relationship' with a suitable example.

- (c) Among halides, lithium iodide is the most covalent in nature. Why?
- (d) Write the name and formula of two peroxyacids of sulphur.
- (e) What are pseudohalogens? Give example.
- (f) What are silanes? Give examples.

5. Answer any *five* of the following questions :

3×5=15

- (a) Write one method of preparation and one use of boric acid. 2+1=3
- (b) Explain the bonding and structure of  $B_2H_6$ . 2+1=3
- (c) Draw the electronic structure of  $HNO_3$ ,  $N_2O_4$  and  $HNO_2$ . 1+1+1=3
- (d) What are interhalogen compounds? Predict the geometry of  $ClF_3$  and  $IF_7$ . 1+1+1=3

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(e) What are carboranes? Give one example and structure of carborane.  $1+1+1=3$

(f) Name the allotropes of phosphorous and draw their structures.  $1+1+1=3$

6. Answer any *two* of the following questions :  $3 \times 2 = 6$

(a) Give one method of preparation and one chemical property of  $\text{XeF}_6$ .

(b) Applying VSEPR theory, explain the geometry of  $\text{XeF}_2$ .

(c) What are clathrates? Give one example of clathrates of noble gases.

7. Answer any *two* of the following questions :  $3 \times 2 = 6$

(a) What are phosphazenes? Give a method of preparation of trimeric phosphonitrilic chloride. What happens when triphosphazene chloride is hydrolysed?  $1+1+1=3$

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- (b) Give one method of preparation and bonding structure of borazine.  $1+2=3$
- (c) Give one method of preparation of linear, crosslinked and cyclic silicones.  $1+1+1=3$

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